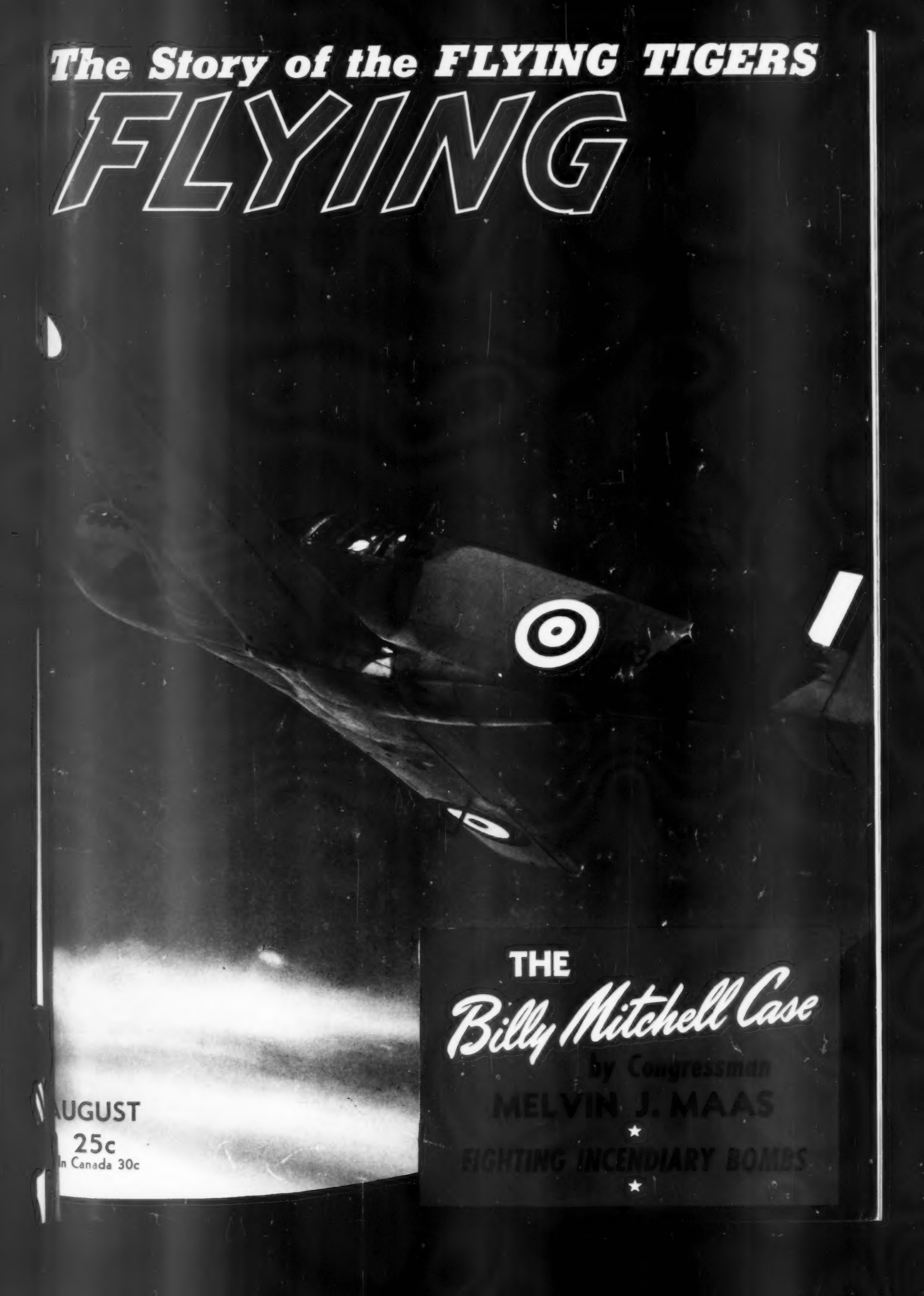
The Story of the FLYING TIGERS

FLYING



THE
Billy Mitchell Case
by Congressman
MELVIN J. MAAS

★

FIGHTING INCENDIARY BOMBS

★

AUGUST
25c
In Canada 30c

"Things are *Looking Up* in Wichita for Young Folks Nowadays"

Captain William H. Records, American Airlines Million Mile Pilot, reports happy landings ahead for young America to Mrs. Records.

"In fact," says Captain Records, "things are looking up for *all of us.* The speed with which they're producing war wings in Wichita spells plenty bad news for Hitler, Hirohito and Company. Those aircraft manufacturers are working 24 hours a day to help win this war. And they'll be working just as hard to win the peace that follows.

"As a result, those youngsters of ours are going to have advantages we've never even dreamed of. For one thing, they'll be travelling along traffic-controlled skyways . . . flying their own Family Car of the Air as naturally as you drive an automobile today. I saw that plane myself at the Cessna Aircraft plant, in blueprints, ready to be produced when this war's over.

"Yes, I know I've been doubtful about the idea of *flying for everyone,* but not since I saw those Cessna blueprints. You'll be shopping a couple of hundred miles away in a morning if you want to, in your Cessna Family Car of the Air. And so will thousands of other folks when this war's over."

We're In The Army Now...24 Hours a Day

Today... and until peace comes to America...Cessna is devoting all of its time to the production of twin-engined Cessnas for the U. S. Army Air Corps and the British Empire Training Program. And these Cessna Bobcats and Cranes are actually flying over a million miles a week in bomber-trainer service. Deliveries are ahead of schedule. And Cessna is pledged to keep them well ahead. That's why we all must wait until this war is won for our Cessna Family Cars of the Air.

Wear Your Wings! Keep 'Em Flying!

Send today for your "Down With The Axis" Wings. Wear them proudly to show you're doing your bit to "Keep 'Em Flying." Just send 10¢ (coin or stamps) to address below and we'll send you a 10¢ Defense Stamp, and enclose your "Keep 'Em Flying" Wings free, postage paid.

The Cessna Aircraft Company, Dept. FPA, Box 1616, Wichita, Kansas

Commencement of new careers will come with the Cessna Family Car of the Air

Yes, new careers, and a new and better way to travel, both for business and pleasure, will come with the Cessna Family Car of the Air. You'll learn to fly it as quickly as you learned to drive a car, only your Cessna will take you three times as far. You'll be cruising away on weekend vacation trips that are once-a-year adventures now. These *wings-for-e* are the latest achievement in Cessn year history. Another was the famou master, three times judged the "W Most Efficient Airplane." After all, i aviation experience like that to bu airplane that *everyone can buy and f* future Cessna Family Car of t

COPR. 1942. CESSNA AIR

Cessna

SYMBOL OF *Aircraftsmans*

FOR THIRTY-ONE YEAR

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PARKS

TRAINING FOR LEADERSHIP

Prepares You to Serve Your Country at War AND Equips You for a Successful Post-War Career

★ Today, with our country at War, you, as a Parks graduate, can serve America better because of your specialized training in the vitally important field of aviation. At the same time, your Parks education equips you to rise to leadership in the great expansion of commercial aviation which is certain to follow the peace.

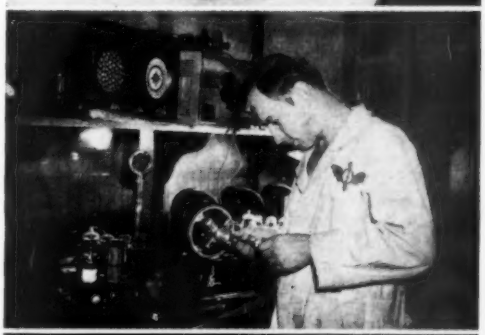
Military air superiority is a major essential of victory, and this requires men who are specially trained for their jobs. Hundreds of Parks graduates today are helping America to achieve this goal.

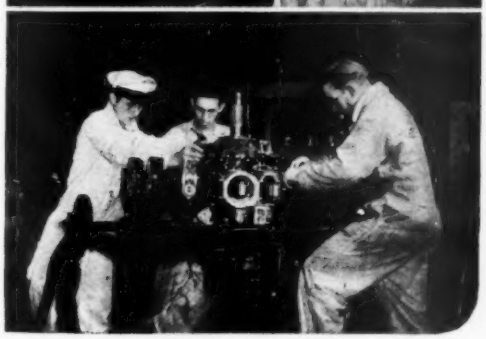
Nearly 100% of Parks graduates are going into work of strategic importance to our War Effort. Some—more than 10%—are themselves flying in the Air Corps or Naval Air Reserve. Others are giving flight training and instruction or are engaged in maintaining, manufacturing, designing, and engineering more and better planes for our armed forces. These men are worth tremendously more to their country than if they had offered themselves untrained.

Just as Parks prepares you to play your part in today's Fight for Freedom, your Parks education also equips you to take advantage of the vast opportunities in commercial aviation after the War.

You'll be in a position to serve your country best if you plan *now* to prepare for leadership at Parks Air College. Remember, too, that Parks *college education majoring in aviation* trains you for a peacetime career in one of the world's greatest industries.

Time is short — never before has the trained man been so valuable to his country. As entrance to Parks is restricted and selective, send the coupon at once for the new 64-page Parks catalog containing full information on each of Parks four courses.





PARKS AIR COLLEGE was founded August 1, 1927. Has enjoyed full Federal approval longer than any other aviation school.

Is accredited in its Aeronautical Engineering School by the Illinois Superintendent of Public Instruction.

Included since 1938 in The Directory of Colleges and Universities, issued by the United States Office of Education.

Has a capacity enrollment of 325 commercial aviation students, also detachments of U. S. A. Air Corps Aviation Cadets and Mechanics. Has its own airport with a school plant of 25 buildings devoted to school purposes entirely, also a group of satellite fields for military flight training.

Has a faculty of 104, each especially qualified for his particular field of instruction.

Open to high school graduates with a ranking in the upper two-thirds of their classes.

PARKS AIR COLLEGE East St. Louis, Illinois

PARKS AIR COLLEGE
East St. Louis, Illinois Section PA-8

Please send me details of four *major* courses in commercial aviation training.

Name..... Age.....

Address.....

City..... State.....

BATTLESHIPS—at long last—are being put where they belong. As has been the case throughout history, a few people (crackpots, you know) foresaw what was coming and dared say so. Naturally, that small, imaginative group did *not* include any of the right people in Washington officialdom. Did not, that is, until modern warfare showed up in full dress within the past three years. Then a few cautious souls, after such fiascos as the *Prince of Wales*, the *Bismarck* and Pearl Harbor, began to realize that any vessel afloat is in deathly peril if not heavily protected from air attack.

But it took our own flyers to thoroughly and conclusively show certain world naval experts what utter fools they have been. Within a few short days U. S. Army and Navy flyers wrote world history. They finally put into practice those many phases of aviation invented by Americans: dive bombing, torpedo bombing, high-level bombing, fighter tactics, aircraft carriers—everything originally devised and perfected by Americans, only to be adopted and used with such devastating effect by others.

Now the battleship—the one last "holdout" of groundling admirals, each one of which cost as much as a good-sized air force—has been marked. It goes where it belonged many years ago: out into left field, instead of behind the home plate. Now congressmen—and Naval aviators—are beginning to discuss the true value of the aircraft carrier publicly, for the first time.

Naval warfare as we have known it—invincible battleships and battle cruisers out to challenge a formal stiff-shirt fight with other battleships and cruisers—has gone forever. The spearhead of any large scale Naval offensive now is the aircraft carrier. But not just the carrier as we know it today. There must be dozens of carriers, including converted merchant ships or cruisers or even battleships. Loaded aboard these carriers should be not only attacking aircraft but all the tools incident to a Naval offensive against enemy strongholds.

In addition to aircraft, these carriers should carry invasion troops, light tanks, artillery, supplies—everything necessary to launch and carry out an invasion independently. These carriers would be accompanied by those former first-line Naval vessels, the battleship and cruiser—but only to act as protection for the carriers against sea attack. The rest of such carrier task forces would consist of destroyers, supply vessels—and cargo vessels to carry additional troops and equipment.

We already have seen some of this kind

(*Continued on page* 115)

FLYING
AND POPULAR AVIATION
Trade Mark Registered
Volume XXXI Number 2

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IS THE *INDISPENSABLE* FACTOR

. . . in building America's war planes
. . . in building YOUR aviation career

The wealth of the world's greatest industrial civilization is ready to fulfill President Roosevelt's far-sighted demand for 185,000 war planes, but it is only a vast heap of material until skilled craftsmen can mould it into long-range bombers and swift pursuit ships. While the aircraft industry has been forced to accept thousands of single-phase workers from cheap "quickie" courses, the vital supervisory positions can only be filled by men with the thorough, long-range training to reach any objective to which they may be assigned. They are the only men of this huge production army who are INDISPENSABLE to America's war effort, and who will continue to be indispensable when the aircraft industry steps down from war to peace schedules.

The executives who have made aviation THEIR career know that there is no substitute for thorough, experienced training, and they know that Curtiss-Wright Technical Institute graduates are—and for many years have been—thoroughly qualified to fill the industry's exacting requirements.

Located in the very center and a very important part of Southern California's great aircraft industry, with its more than two billion dollars in unfilled orders, Curtiss-Wright Tec has come to be recognized as the nation's leading institution for the training of Aeronautical Engineers and Master Mechanics. Mr. Donald Douglas, President of the great Douglas Aircraft Company, chose this school for his own son's training, which pointedly indicates the high standing Curtiss-Wright Tec has attained in the aircraft industry since its establishment in 1929.

It is imperative that before you invest in a course of career training you determine what the returns will be on your investment . . . for your choice of a school in which to take your training will determine how much money you will make all the rest of your life.

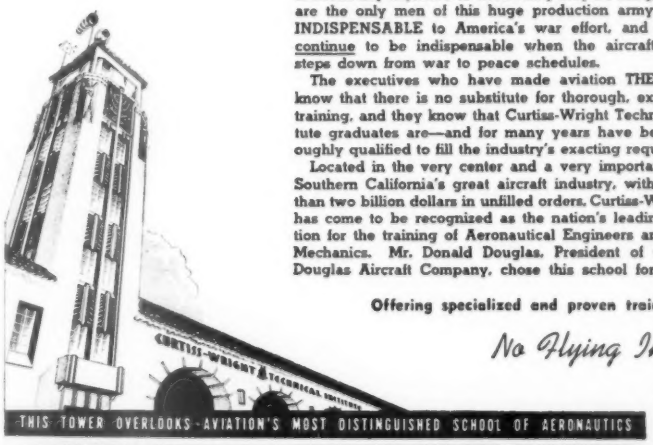
Curtiss-Wright Tec's career training is carefully designed to do just one thing:—TO MAKE MONEY FOR YOU, so upon graduation you can be independent and self-supporting for life. Our thousands of successful graduates have proven that Curtiss-Wright Tec training gets results and always pays, since it trained them in advance for the highest position they could ever expect to occupy. It can do the same for you.

This school has never guaranteed positions for its graduates, but practically every graduate has obtained immediate employment and is advancing rapidly. The demand for our graduates far exceeds the supply, and we honestly believe that every student who enrolls here will be able to obtain, with our assistance, immediate employment upon graduation.

WARNING!—"Don't miss the boat." The greatest opportunity in your lifetime exists today! There never was such an opportunity in aviation for you; there may never be another. A position awaits you. Insure for yourself a steady income and independence for life. DON'T FOLLOW—LEAD! Send in your enrollment before you "miss the boat."

Offering specialized and proven training in AERONAUTICAL ENGINEERING & MASTER MECHANICS

No Flying Involved



THIS TOWER OVERLOOKS AVIATION'S MOST DISTINGUISHED SCHOOL OF AERONAUTICS

CURTISS WRIGHT TECHNICAL INSTITUTE

GRAND CENTRAL AIR TERMINAL 1225 AIRWAY GLENDALE (LOS ANGELES) CALIF
UNDER PERSONAL SUPERVISION OF MAJOR C. C. MOSELEY, OWNER, SINCE ITS ESTABLISHMENT IN 1929

Contractor to the U. S. Army Air Corps

BE WISE—PROTECT YOUR FUTURE

MAIL TODAY • DON'T DELAY

WITHOUT COST OR OBLIGATION SEND ME FULL INFORMATION AND CATALOG ON THE COURSE CHECKED BELOW

- ☐ AERONAUTICAL ENGINEERING COURSE
- ☐ MASTER AVIATION MECHANIC COURSE
- ☐ SPECIALIZED ENGINE COURSE
- ☐ SPECIALIZED AIRPLANE COURSE
- ☐ SPECIALIZED AIRCRAFT WELDING COURSE
- ☐ POST GRADUATE AERONAUTICAL ENGINEERING COURSE
- ☐ SPECIALIZED AIRCRAFT SHEET METAL COURSE
- ☐ AERONAUTICAL DRAFTING COURSE, HOME STUDY
- ☐ AIRCRAFT BLUE PRINT READING COURSE, HOME STUDY

NAME

ADDRESS

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New! Amazing Achievement

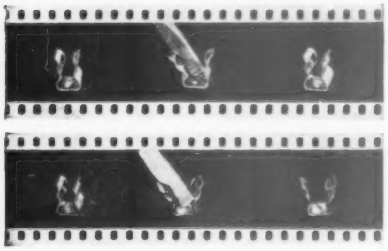
In Fuse Clip
FATIGUE RESISTANCE!
Now Available In
LITTELFUSE

Littelfuse Be. Cu. Fuse Clips especially designed for Aircraft, and other uses of most severe stresses. Spring quality of steel.

Beryllium Copper Fuse Clips

They withstand *severest, longest* vibration—show *greater* tensile strength, and resistance to heat and corrosion. *Three times the grip of best phosphor bronze!*

Movie photo of screw driver test shows Littelfuse Be. Cu. Fuse Clip's instant return to perfect form.



Same test of phosphor bronze clips. Observe deformed condition after test.

Ask for Littelfuse Be. Cu. Fuse Clip Folder giving details. Send for Complete Catalog of Littelfuses for every aircraft and instrument purpose.

LITTELFUSE INC.

"First in Aircraft Fuses—Pioneer in the Industry"

4793 Ravenswood Ave., Chicago, Ill.

263 Ong St., El Monte (Los Angeles Suburb), Calif.

LET'S GO! U.S.A. KEEP 'EM FLYING!

BE A U. S. ARMY AVIATION CADET

Letters

Giant

Sirs:

. . . I found the article "The Care and Feeding of a Giant" [June, 1942] . . . most interesting. The spectacular achievements of military aircraft are equaled by the glorious record of the carriers, which have laid the foundation of aviation as it is today. I think that the article was timely and well done.

DONALD W. DOUGLAS
President
Douglas Aircraft Company, Inc.
Santa Monica, Calif.

Silhouettes

Sirs:

. . . In reference to the plane identification silhouettes, we think that the solid black and white combinations, especially the heavy white lines, tend to emphasize details which are not visible from a distance and draw some attention from pertinent details . . . such a drawing should not show any detail which is not visible at a distance at which identification insignia are clearly visible. We suggest that drawings such as used in the advertisement on page 83, FLYING, May issue, would be of more use . . . in leaving a mental picture of what the plane actually would look like . . .

EARL E. CRESS.
Westcliffe, Colo.

● As developed by the British over a period of several years, aircraft silhouettes are most easily recognized when they include the white lines. Many times those lines clarify or emphasize a feature of that particular aircraft that might not be easily spotted otherwise. Also, aircraft identification often is practiced at close range, where lines can be seen by the observer.—ED.

Zero

Sirs:

. . . In your April issue you published the silhouette of the Nakajima 97 (Navy) fighter. Is this the fighter the newspapers always mention as the Zero fighter? Do you know the armament or the color scheme? . . .

EDWARD JARBECK.
Chicago, Ill.

● The Zero fighter is the Mitsubishi 00, not the Nakajima 97. A silhouette of the Zero is published on page 37 of this issue. —ED.

Friend or Enemy?

Sirs:

In your . . . issue of May . . . page 37 . . . you have a description of a Messerschmitt Me-110, but on the side of the fuselage and . . . underside of the wings there is a British marking. Is this an Allied plane picture put there by mistake? . . .

JEAN PAUL VINCENT
Montreal, Que.

● The Me-110 pictured in the May issue is one of many German aircraft captured by the British. After capture, the markings are changed to those of the RAF, then the ship is given exhaustive flight tests by RAF experts. In some fields of battle the British have used repainted enemy aircraft for certain flight missions. —Ed.

Critic

Sirs:

. . . I read with . . . interest . . . "I Learned About Flying From That" by Leon Brink [FLYING, May]. I have several criticisms . . . First, I can't see how the author learned very much from his experience, nor how he figures anyone else can do so. Second, he advocates abolition of single-engined over-water flight. Why? Third, gaining altitude is a waste of time as he sees it. Why? Is not altitude distinctly an advantage to a pilot who may have trouble? Complete power failure without warning is rare these days or even at the time of this occurrence. Fourth, where is the wisdom of saving a 15- or 20-minute climb and then sitting on an inner tube for 52 hours at sea? Fifth, Mr. Brink criticizes the allowing of overwater flight in single-engined planes and then states he likes to fly about 20 feet altitude. Instruments are classed as a nuisance. The CAA says "minimum 300 feet." Sixth, his account of engine failure is pretty vague. He "thinks" it was a valve. Does not a man of Mr. Brink's experience in the air know a better reason? To my knowledge a valve should not cause complete engine failure unless the engine "swallowed" it into a cylinder. There is no mention of a cylinder being blown off. Broken springs, valve sticking, push rod failure or failure to seat could not account for over one cylinder cutting out. Seventh, with 2,000 or 3,000 feet altitude a seven-cylinder engine will "stretch" a glide many times normal . . . At Mr. Brink's altitude though, as he says, all a man can do is pull up and "drop 'er in." Eighth, Mr. Brink "believed" his ship to be in "perfect shape." I have wondered if he checked before take-off or took for granted its condition, since he knew it had recently been overhauled? . . .

W. J. SWANSON.
Naval Air Station
Pensacola, Fla.

● As a pilot, Reader Swanson should know most of the answers to his own questions. Mr. Brink made an important point in his article: overwater flight with single-engined landplanes is an extreme-

(*Continued on page* 104)

Photos courtesy of the Congressional School of Aviation, Rockville, Maryland, where Waco's are used for secondary instruction.

Busiest Ship on the field

First ship on the line of a morning—last ship rolled in at night . . . that's the story wherever Wacos are found.

Ask the Instructor Why. He'll tell you that Waco's husky construction . . . its safe, wide landing gear . . . its wider margin between cruising and stalling speed . . . all 'round dependability . . . gives him a sense of security—makes his job easier.

Ask the Student Why. He'll tell you that Waco's sensitiveness to controls . . . its easy maneuverability in the air and on the ground . . . its absence of unusual characteristics . . . gives him the "feel" of the ship quickly.

Ask the Operator Why. He'll tell you that Waco's ruggedness and ability to stand up under strain and stress makes it easier to keep on the line—and these features plus low maintenance cost mean money in the till.

Yes, ask the pilot, the student or the operator—then you'll understand Waco's popularity . . . the reason why they're "the busiest ships on the field."

THE WACO AIRCRAFT CO.
Troy, Ohio

WACO AIRPLANES

worth waiting for!

Days, weeks, months of strenuous duty; then that proud day when the Commander awards those coveted wings! They are worth all the waiting; all the effort.

And so, too, will you find that the new *Culver Victory Model* is worth waiting for. True, there are busy, strenuous days ahead for us all but the war will come to an end . . . and Culver will return to peacetime production of the ideal cross-country airplane—a new plane that will astound the world of aviation.

UNDER CONTRACT TO THE U. S. ARMY AIR CORPS

CULVER

AIRCRAFT CORPORATION

CULVER AIRPORT WICHITA, KANSAS

LET'S GO! U.S.A. KEEP 'EM FLYING!

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Culver Aircraft Corp., Wichita, Kansas

Curtiss dive bomber SB2C-1 fabricated with Boots Self-Locking Nuts.

HOW BOOTS NUTS SPEED PRODUCTION AND REDUCE COSTS FOR CURTISS

Just as "a penny saved is a penny earned," so a man-hour saved today is one more step in our common all-out production effort.

Curtiss-Wright was quick to grasp the labor saving opportunities afforded by the adaptable Boots Self-Locking Anchor Nut.

The Boots Anchor Nut supplied with dimpled rivet holes was adopted by Curtiss-Wright to save many valuable man-hours per airplane in the construction of the SB2C-1 and SO3C-1 over previous available methods.

The release of important machinery, the elimination of operations, the saving of factory space and man power and precious minutes for other work means much to Curtiss in their race against time.

In addition, Boots Self-Locking Nuts are considerably lighter, and offer permanently safe protection against loosening due to vibration and other causes.

BOOTS

Self-Locking Nuts For Application In All Industries

Cutaway of Boots Anchor Nut with dimpled rivet hole. Boots Anchor Nuts are made of sheet metal. They are available with rivet holes for 78° or 100° rivets. Write for new catalog today.

BOOTS AIRCRAFT NUT CORPORATION ★ NEW CANAAN, CONNECTICUT

The Birdmen's Perch

WE WISH TO DISCLAIM any responsibility for the creature (?) you see on this page.

This fluffy fugitive from a gilded cage seems to have hatched out from a drop of Gulfpride that splashed on the page while we wrote. From the looks of it, it's not even soloed yet, despite all the pretty trimmings. Furthermore, it behaves as though it's planning to make The Perch its home 'port. We suppose that out of common decency we ought to give it a name.

Better yet—YOU give it a name! Something like "Oscar Octane" or "The Gashawk."

C'mon, gang, christen this bedraggled derelict. And if you've any tips for pilots that *you* had to learn the hard way, send 'em in and we'll have the Oily Bird tell the rest of the fellows about it.

Major Al Williams

alias, "Tattered Wing Tips," Gulf Aviation Products Manager, Gulf Bldg., Pittsburgh, Pa.

MAPPERS OF THE COLD, COLD GROUND

More than ¾ of the area of the United States have been photomapped from the air. To make an aerial map requires the fitting together of thousands of pictures. Yet almost ⅔ of each vertical photo is thrown out.

Due to lens curvature and other factors, the sides of the film strips are distorted. A map would be useless if these parts of the pictures were used. By eliminating them, cartographers make the photos do a better job.

An oil refiner has much the same problem. Crude oil contains various non-lubricating materials which make it useless for modern close-tolerance engines. By refining the crude, most of these carbon makers and sludge formers are thrown out. Eliminating them makes the oil do a better job of lubrication.

At Gulf, we use a special refining procedure called the Alchlor Process. This method of refining "throws out" *more* of the non-lubricants from Gulfpride. It "trims the edges" so thoroughly that Gulfpride does a *BETTER*, better job of lubrication.

It makes a dollar do a better job, too.

THIS MONTH'S BRAIN TWISTER

(Censorship permitting)

Whenever it rained in the afternoon, at a certain airport, it was fine in the morning. When it rained in the morning, it was fine

in the afternoon. Over a period of time it rained 7 days, was fine on 5 afternoons and 6 mornings.

How many days does this cover?

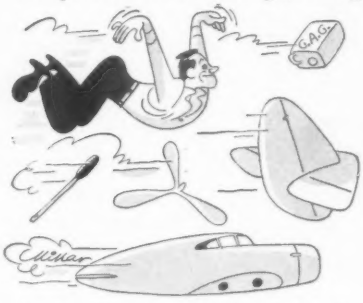
THIS MONTH'S WHOPPER

Dear Major:

A while back, you mentioned a tailless plane without a fuselage. It seemed like the wrong approach to a good idea. A wing is bound to contribute drag. I tried to solve the problem of drag a different way. I made a tailless plane without a *wing*. And Major, it was a blue-streak whiz-z-Z!

But wouldn't fly.

I dispensed with the fuselage, leaving



only the controls. THEY wouldn't fly. I got rid of the controls. That left just me.

And *I* wouldn't fly—

Remembering some of your fantastic stories about Gulf Aviation Gasoline, I got some. I put some on the fuselage, some on the controls, and I drank some.

Now we all fly! Independently *or* assembled!

Fast, too.

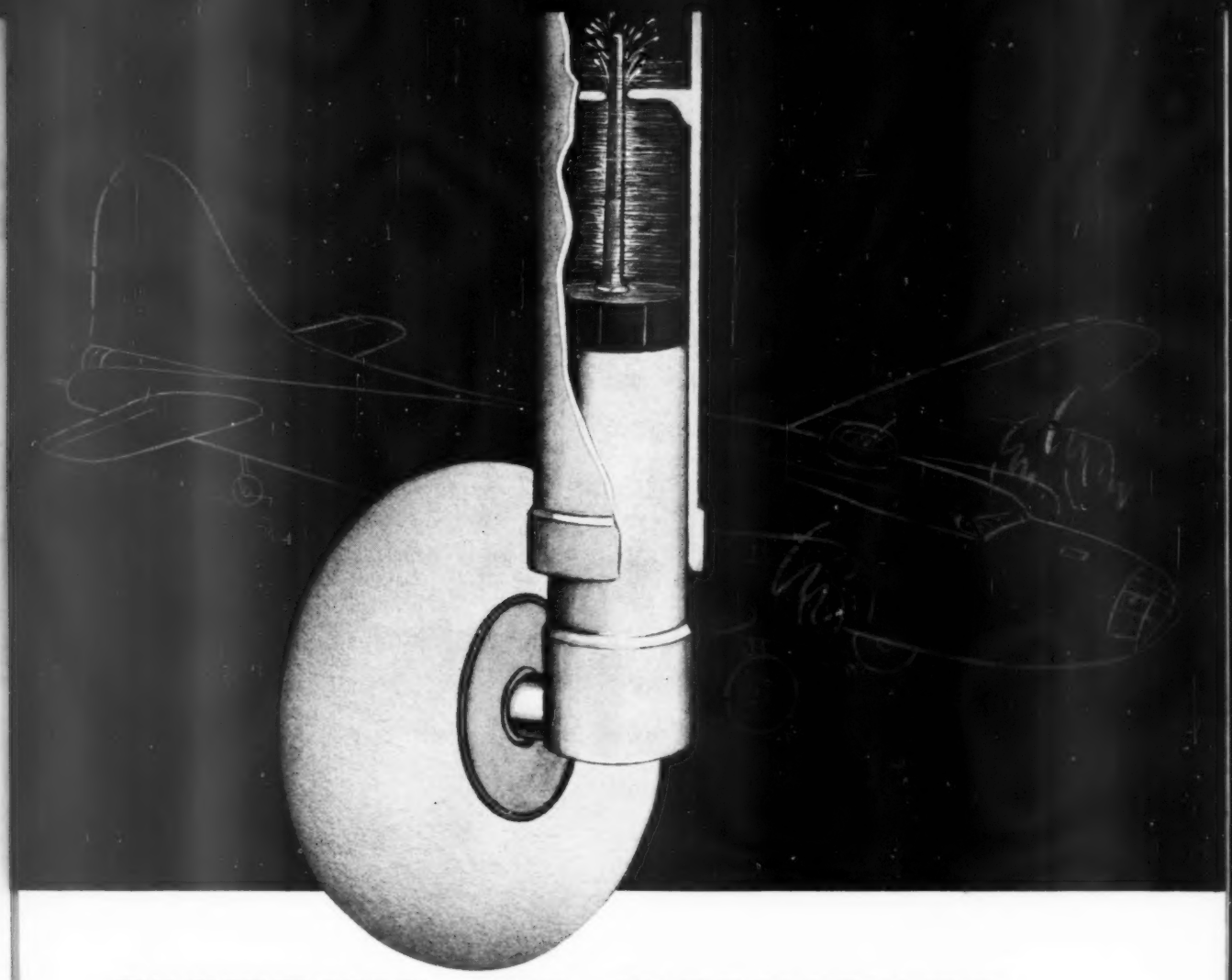
"Great-Circle" Gribbin, Mount Kisco, N. Y.

Gulf Oil Corporation and Gulf Refining Company... makers of

GULF AVIATION PRODUCTS

OIL IS AMMUNITION — USE IT WISELY !

TUNE IN "WE THE PEOPLE" AT WAR. SUNDAY NIGHT 7:30 EWT COLUMBIA NETWORK



FIGHTING OIL MOLECULES *insure* SAFE AIRPLANE LANDINGS

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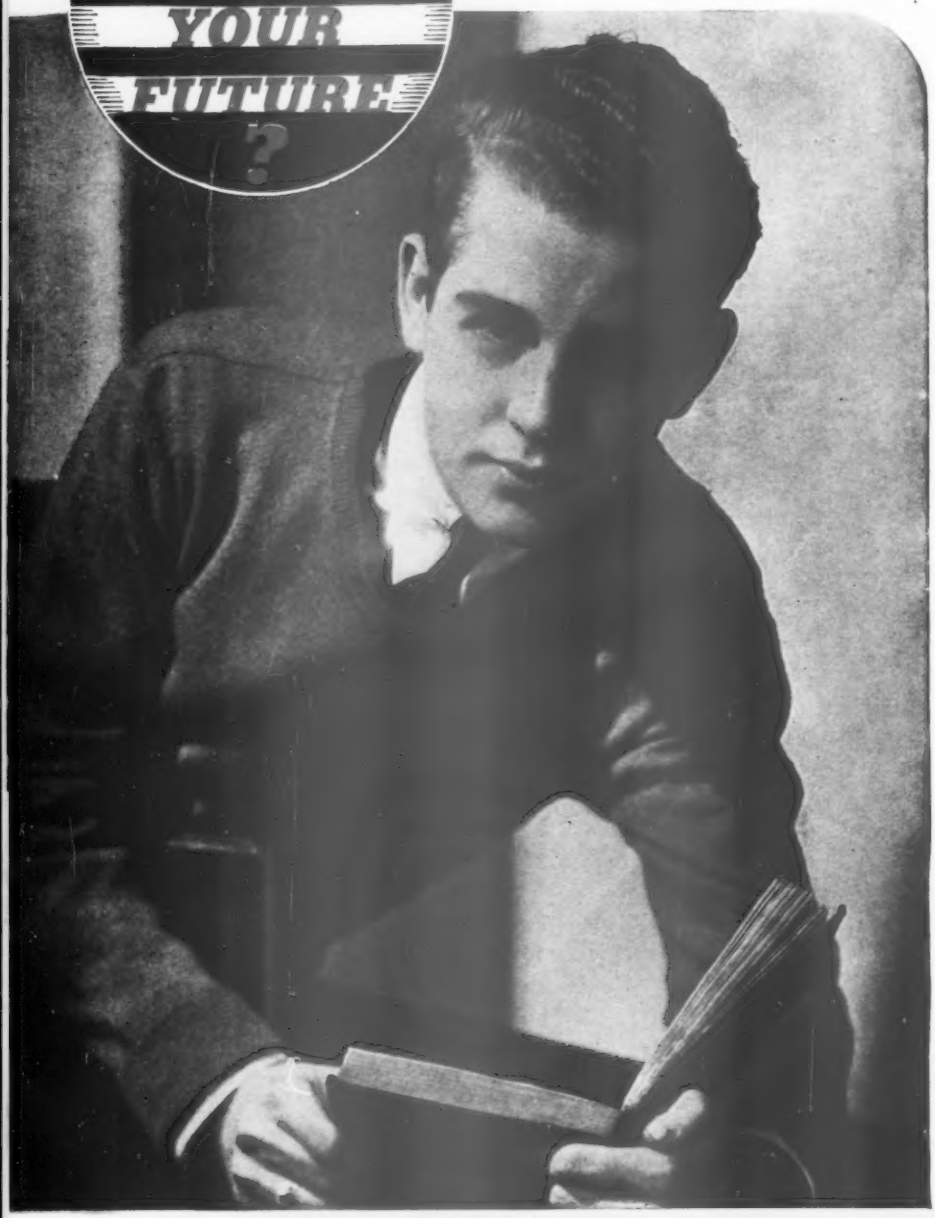

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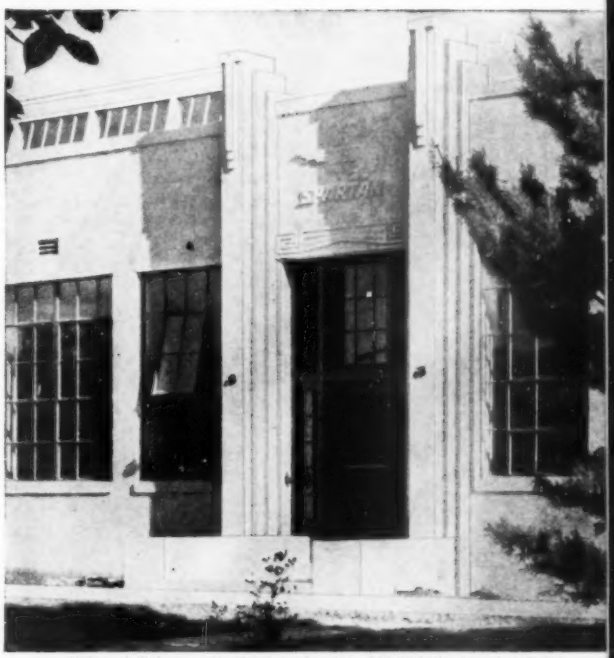
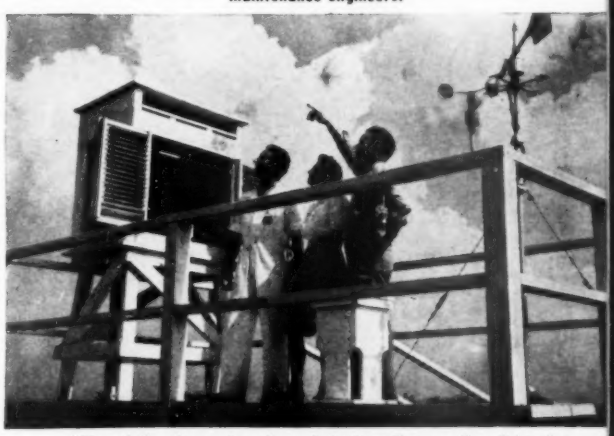


(Above) Entrance to the new Spartan $30,000 Engineering Building, designed especially for training aeronautical and airline maintenance engineers.



(Above) Spartan meteorology students gather weather data atop the school's weather observation tower.

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THE BILLY MITCHELL CASE

by Rep. MELVIN J. MAAS

Congressman Maas was born in Duluth, Minn., May 14, 1898. In 1917, he joined the aviation branch of the Marine Corps and served for 21 months, including 10 months overseas. He has remained in the Marine Corps Reserve and now holds a colonel's commission. He was elected to the House of Representatives by the fourth district of Minnesota in 1927, and has served there ever since. He is recognized as one of the leading aviation authorities in Congress.

Today's total war proves the sound basis of General Mitchell's tempestuous but determined stand for recognition of air power.

EVEN a prophet can talk too much.

Billy Mitchell was such a prophet—small, long-nosed, thin-lipped, sharp-featured and acid-tongued William Lendrum Mitchell, whose spectacular and brilliant career in the Army was marked by such zeal and devotion to the cause of air power that his name is linked inseparably in the public mind with the growth of aviation in this country.

He was a prophet. And yet he talked too much, whatever the reason—bitterness over the frustration of his plans and hopes for American might in the air, belief that the Army and Navy were blocking air development deliberately—some of the reasons appear in Mitchell's writings, others none but Mitchell knew. He spoke out harshly, and the result was to mar the effectiveness of the work he and like-minded men had done, because the justice of his cause and the logic of his reasoning were buried in the storm of his own intemperate words and the angry retorts of those whom he accused.

It has been 16 years since Mitchell resigned from the Army, six years since he died. Yet today the mere mention of his name, in almost any group at almost any place in America, is enough to start a heated argument as to the validity of his beliefs.

Almost everybody has heard of Billy Mitchell, and almost everybody has heard enough about his views—in more or less garbled form—to express an opinion of them. Those who know the facts argue the points somewhat more closely than those who do not but now, as when Mitchell was alive, emotion is rather apt to outrun reason, and a close adherence to accuracy is not allowed to cool the heat of debate.

To Mitchell, those who agreed with him were friends. Those who disagreed were, to his notion and that of his enthusiastic and devoted partisans, patently fools and suspect of knavery. For Billy Mitchell had devoted friends and inspired a passionate loyalty; and he had a corollary faculty of cooking up a bitter broth of enmity and antagonism.

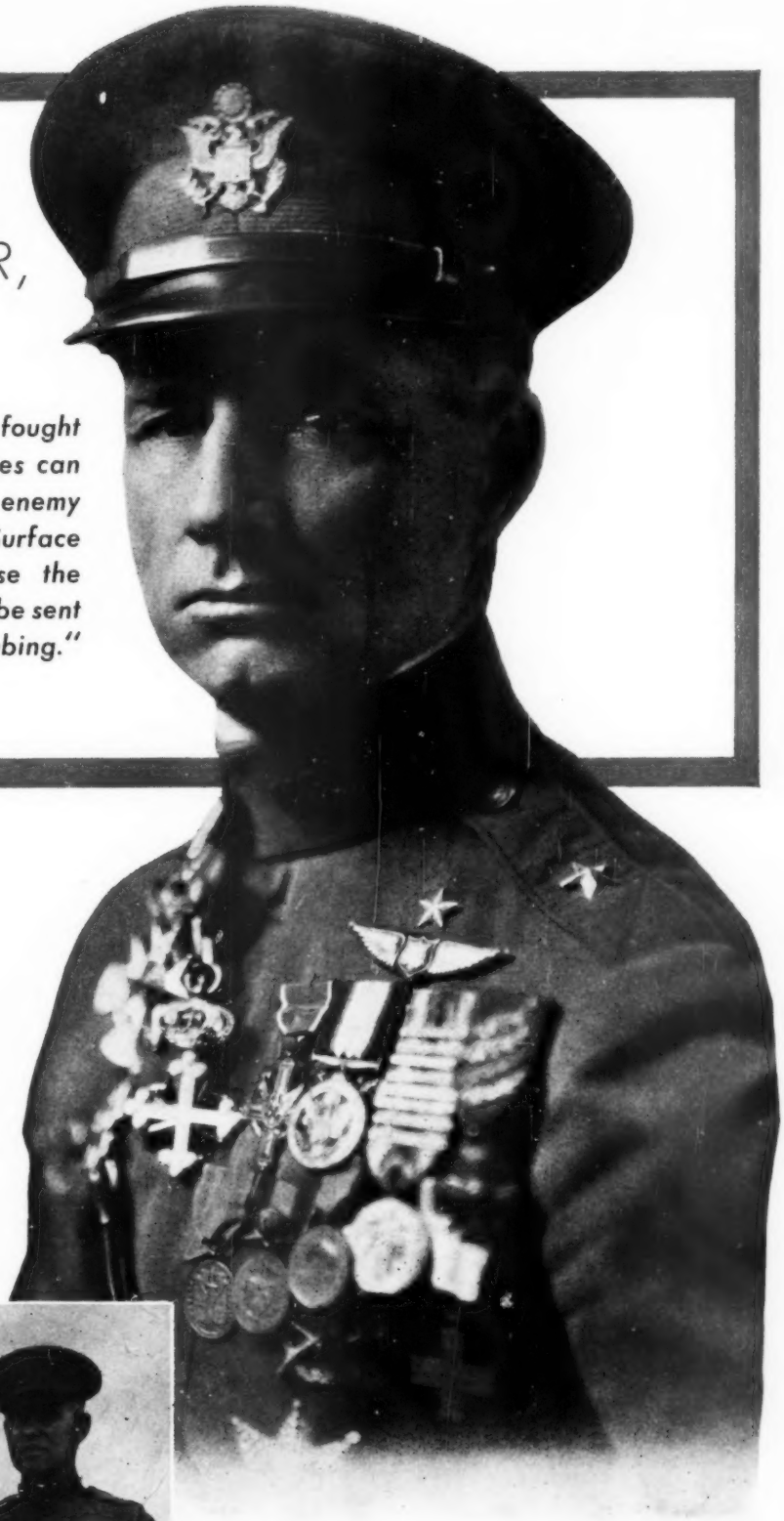
It was his misfortune, and the country's, that this latter faculty obscured for

Maj. (now Maj. Gen.) Ralph Royce shows his former chief a Martin B-10 bomber used in Army's 1934 flight to Alaska.

Exuding confidence, Mitchell arrives at the court martial, accompanied by his aide, Capt. (now Maj. Gen.) Robert Olds.

DECEMBER, 1924

". . . Future wars will be fought in the sky and only air forces can cope with the threat of enemy planes and submarines. Surface navies are useless because the most modern battleship can be sent to the bottom by aerial bombing."



many years the truth of a large part of Mitchell's knowledge and prescience. The hurly-burly over his public statements very nearly reduced the whole subject of American military air power to a scandalously personal basis. A matter of high Government policy, of vital importance to the war machine of the United States, involving the safety of the republic and the future of the world, came dangerously close to degenerating into a name-calling feud between the pro- and anti-Billy Mitchell factions—in the Army, in the Congress, in the public at large.

This was by no means the fault of Mitchell alone. It is a common human failing, a kind of universal shortcoming, to reach a decision on policy on the basis of the personalities involved in any given

General Mitchell, left, with Maj. (now Lieut. Gen.) H. H. Arnold, center, and Maj. (now Lieut. Gen.) G. H. Brett, at the American Legion's 1923 convention.

situation—and Mitchell's enemies blithely ignored the logic of his arguments because they disliked him personally.

Today, the developments of total war have demonstrated conclusively the accuracy of a large part of Mitchell's prophetic vision concerning air power. If they have demonstrated equally conclusively the fallacy of other forecasts which he made in that positive fashion which brooked no argument, that does not for a moment destroy the validity of his major thesis.

The real tragedy of Mitchell's career was impatience— his inability to compromise, to achieve his ends by the accumulation of little gains, to let time and reason work for him. Had he been more patient, many of the changes he advocated in all probability would have happened much sooner than they did.

For many of them did come about—some in his lifetime, others only after the unanswerable and imperative demands of a nation at war hastened the tempo of change. The Air Forces got its separate promotion list, slowly achieved virtual autonomy and, since the recent streamlining of the Army, approaches very closely Mitchell's idea of an independent air arm, co-equal with the sea and ground forces.

The General Staff, at which Mitchell aimed some of his most withering blasts, is now half made up of air officers. The chief of the Army Air Forces is outranked by only two men in the entire Army: the Chief of Staff and General Douglas MacArthur. He sits as one of three American officers—land, sea and air—at the councils of the Combined Chiefs of Staff directing the war strategy of the United Nations. And the size, actual and contemplated, of the force commanded by Lieut. Gen. Henry H. Arnold—who was, incidentally, his close personal friend—probably would make even Mitchell gasp.

Not long ago the Military Affairs Committee of the House of Representatives rejected another proposal to honor Mitchell posthumously by restoring his name to the Army retired list with the rank he once held of brigadier general. Perhaps a review of his career, in the light of developments, will indicate why such an action would be an empty honor to an able man who was quite capable of standing on his own feet, and who left the Army by his own will.

Billy Mitchell's arrival in the world attracted no such attention as his departure from it, although his family did not lack prominence. He was born December 29, 1879, while his parents were sojourning for a time at Nice, that picture postcard Riviera playground of the well-to-do in the good old days.

It would be a safe bet that his father, a former senator from Wisconsin and comfortably aware of his own secure position, had not even the faintest inkling that his principal claim to fame a half-century later would be the fact that, in this infant on whom he bestowed the name William Lendrum, he had fathered the center of the bitterest Army controversy of the twentieth century.

Sen. John Lendrum Mitchell had been a soldier in the Civil War and there was a lot of the military in the youthful education of his son. The soldierly tradition, and soldierly learning, were strong in the heart and mind of this rather romantic young man and, when the War with Spain began, Billy—then living in Washington with his parents—volunteered immediately. The family home was in Wisconsin and he had been in school at Racine, so it was there he went to join the Army, as an 18-year-old private in Company M, First Wisconsin Infantry. By the time his outfit reached Cuba he was already a lieutenant and his career had been decided for him.

In Cuba he was on the staff of Gen. Fitzhugh Lee and later, serving in the Philippines during the insurrection, was one of the youngest staff officers with Gen. Arthur MacArthur, whose son (now commanding the United Nations' forces in the Pacific from his headquarters in Australia) was to sit a quarter of a century later as a member of the court-martial which found Col., formerly Brig. Gen., William Lendrum Mitchell guilty of violations of the Ninety-Sixth Article of War.

Early in his career in the Army, Mitchell had specialized in communications, and his interest was turned to aviation only through the simple fact that the Army, when the Wright brothers developed their first military planes, actually didn't quite know how to co-ordinate these new contraptions with existing Army procedure and finally turned them over to the Signal Corps.

Mitchell was one of the small group which witnessed the historic first demonstration of a military plane by the Wrights at Fort Myer, Va., in September, 1908. Six years later he was taught to fly by Orville Wright, soloing after only two hours of the master's tutelage. The controversy that rocked the Army and was a national sensation was born at that moment, although of course neither Mitchell nor anyone else could foresee what the future held.

In March, 1917, having completed a tour of duty with the General Staff, Mitchell—a major now—was in Spain on leave. The declaration of war by the United States against Germany on April 6 found him in Toledo, and he went immediately to Paris. There, through special arrangement, he was attached to the staff of General Petain and became one of the first American officers to participate with the French in an attack.

As the organization of the AEF developed, Mitchell was assigned to help Maj. Gen. Mason M. Patrick in building up an American air force, and ultimately he succeeded to the command of all United States air units in France. Although offi-

(*Continued on page* 58)

Mitchell (left, center) smilingly distributes copies of his resignation from the Army to newspapermen. He chose to resign rather than accept sentence of five years suspension of rank and pay.

Satisfactory progress of United Nations' training program was reported by these 90 delegates.

AIR TRAINING CONFERENCE

By FRANCIS FLAHERTY
Press Gallery, House of Commons, Canada

Training of air crews keeps pace with output of warplanes, say United Nations' representatives. Hint an international aerial force to police post-war world.

VISIONS of the possibility of a great international air police force which in some happier future time may maintain peace throughout the world were conjured up when representatives of 14 nations met in Ottawa recently to discuss ways and means of co-ordinating their air training activities.

The results of the conference are hard to define because reasons of military security prevented a full public statement of the subject matter discussed or the conclusions reached. The fact, however, that 14 nations could exchange many of their most cherished military secrets in perfect confidence and work together on common plans holds interesting possibilities for a war-torn world in which airpower assumes increasing importance.

The Ottawa Air Training Conference, as it was officially named, was called for the purpose of achieving a greater degree of standardization in the air training programs and a greater degree of co-ordination of the air objectives of the United Nations. In other words it was concerned primarily with the human factor in airpower as distinct from the material factor, with the men who fly rather than with the planes in which they fly.

The results in the realm of standardization were less than it was hoped they would be but the value of the conference in terms of exchange of information and co-ordination of objectives was greater than any of the delegates expected when they entered the conference rooms.

Prior to the conference some of its Canadian sponsors toyed with the idea of a United Nations pool of air crews, all trained by similar methods and to the same standards of efficiency from which groups of men could be allocated to any front, regardless of nationality. That idea did not go over. The conference came to the conclusion the best results could be obtained by each country proceeding with air training in its own way but standardizing by taking advantage of the other fellow's experience and by each keeping its own nationals separate in combat operations.

As an approach toward the co-ordination of objectives the conference made a survey of the actual and potential strength of the United Nations in air crews. It found that at the moment sufficient trained air crews were available to man available planes. An approach was made to setting a training objective for each country which will, roughly, keep the sum total of trained air crews coming out of training in step with the expanding output of aircraft factories.

As originally conceived the conference was to be a meeting of the nations interested in air training in North America, of whom the big three are the United States, Canada and Great Britain. While its long term effects will probably be reflected in the activities of all 14 nations which eventually sent delegations the "big three" agreed on an immediate measure of co-ordination.

It was the formation of a "combined committee on air training in North America" with headquarters in Washington. The committee will submit agreed recommendations to the three governments and will function on lines similar to those of the United States-Canada Joint Defense

(*Continued on page* 98)

JAPS ARE THEIR SPECIALTY

Hidden in the Burma jungle, this American pilot and Chinese ground crew spend some of their non-flying time aligning the guns of a P-40. This airman shot down one Jap for each of the small flags.

by RUSS JOHNSTON

Everyone has been talking about the Flying Tigers lately. Here, for a change, those phenomenal Yanks discuss themselves.

"SLASHING, twisting, turning, Tiger flyers of the American Volunteer Group hurled themselves recklessly against the enemy. Applying every unorthodox method of aerial combat, these wild men of the skies completely bewildered and put to flight Nippon's best airmen."

Bunk! That's what the American public has been lead to believe about the Flying Tigers of Burma. It makes good reading, sounds nice in headlines, stimulates the imagination but upon investigation it falls flatter than a pancake on a hot griddle.

Now that Uncle Sam has stepped into the war and diplomacy is no longer necessary, the true story of these "madmen of the skies" can be told and it proves conclusively that these defenders of Burma were neither madmen nor reckless fighters.

I have talked to these flyers over a cool glass of beer in a quiet restaurant far from the battlefield, I have visited them in their hotel rooms, watched them at work on their new jobs back in this country and can report that there was nothing fantastic in the story of the Flying Tigers who, like the men on Bataan, simply out-flew, out-fought and out-maneuvered the Japanese. It would make a swell story if I were to follow in the footsteps of the press and dish out a wild yarn about the devil-may-care flying of these American heroes, but I'm going to tell it to you just the way it was told to me.

"We whipped the Japanese in nearly every encounter because we *out-thought* them, not because we *out-fought* them."

In that simple statement we find a tribute to their leader—quiet, efficient, Col. Claire L. Chennault, now Brigadier General Chennault. It is also a tribute to the men who designed and engineered the Curtiss P-40C's that were used in the Burma fighting. In it is a tribute to the extensive and thorough combat training of the United States Army and Navy and Marine Corps. Above all it is a tribute to America because here, for the first time in action, were American pilots, in American planes, fighting under American command. If there's any doubt in your mind as to the outcome of our present war with Japan let these Flying Tigers, now home from Burma, tell the story.

"In that first savage Japanese raid on Kunming, hoping to catch us on the ground, only one out of 27 attacking bombers escaped to tell the story." That's what Larry Moore, blond, 22-year-old staff secretary to General Chennault, told me the other day when I visited him on the set at Republic studios where he is

working as technical advisor on "The Flying Tigers."

But better still, let's get the story from Walter Pentecost, who had complete charge of the engineering section of the AVG. He was the man who inspected every airplane, saw to it that they were fit and ready to fly, supervised the repair, overhaul and maintenance of the warbirds.

Walter is 30 years old, but he looks older. He was the first man of the AVG to set foot on Burmese soil when he landed at Rangoon early in 1940 to supervise the unloading and assembling of the first P-40's.

"Don't let me hear you folks say anything against the P-40's," was his quiet warning. "There are a lot of things that can be improved about them, sure, but stacked up alongside the Jap "0's", (the famed Japanese Zero fighters) they're head and shoulders above them."

"Take leak-proof tanks, for instance. How the Japanese ever thought they could fight a major war without them, I'll never know. A couple of bursts in the Jap tanks and they go up in flames. Thank God our boys had bullet-proof, self-sealing tanks that swallowed the Jap bullets.

"Then the matter of armor plating. I've looked at dozens of wrecked Jap planes, both fighters and bombers, and I have yet to see a piece of bullet-proof steel. The armor plating on our P-40's is about as perfect as could be expected. Time after time the boys bring them back full of holes but thanks to this protection, they have nary a scratch on themselves."

All Tiger pilots wear a placard telling Chinese to aid and protect the wearer.

Of course leak-proof tanks and armor plate are heavy. So is the sturdy dural with which the ships are built. It's this added weight, plus the low horsepower of the early Allisons (about 1,050 h.p. for take-off) which gave the Japs superiority in maneuverability and climb. When the Tigers were able to open them up and leave them open for awhile the Curtiss ships were faster than the Zero's—and the P-40 in a *dive* is a thing to behold.

The AVG boys would hide in wait behind the clouds until the Japs showed up on schedule (as they always did), then, poking the nose at the ground and opening wide the throttle, they'd come tearing down. With pointed shark-teeth gleaming in the sunlight they'd be on the Jap bombers before they had time to man the guns.

Most of the Tigers told me that in this dive they'd aim for the Jap motors. A hit in the powerhouse with even the lightest ammunition seemed to explode the Jap engines in mid-air. Then the AVG boys would haul back on the stick to climb again for precious altitude.

The superman stories about the AVG, fortunately, are all a myth. These men were using standard U. S. combat training planes with special adaptations worked out for them by General Chennault. There isn't an AVG man to whom I've talked who wasn't utterly devoted to this slim, greying general of the Burma front. Chennault knows flying, knows Burma and he knows the Japanese. He had been U. S. military advisor to China's Chiang Kai-shek, had seen the Chinese coolies move the factories of China on their backs and had later witnessed the bombing of these reconstructed defenseless factories by Japanese planes.

It was Chennault who planned the bases, commanded the operations and instructed the pilots in the art of shooting down the Japanese bombers and fighters.

Back from a battle with the Jap, these Tigers discuss the fight. Pilot at right wears a U. S. Army insigne.

About to take off for a day's operations against the Jap, Tiger pilots get their instructions from General Chennault (pointing). AVG group now is part of U. S. Army.

It was a job that had to be done slowly, carefully and with fine regard for international law.

While a defenseless China was being bombed, the Curtiss planes were shipped to Rangoon, assembled and flown to training fields in northern Burma. England, at that time, was not at war with Japan though war-clouds were smouldering on the horizon. Strict neutrality had to be observed. No flights from Burma could be made over Japanese held territory. After weeks of planning and training, the AVG squadrons were moved to Kunming, in Yunnan province, to begin operations.

How many P-40's were there? Not enough. But let Walter Pentecost answer that more fully.

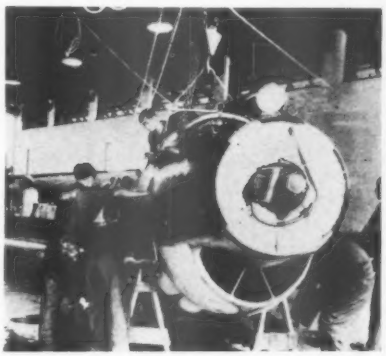
"The original order was for 100 planes. A lot of these were diverted from original British orders and arrived in Rangoon with the British insignia on them. One slipped off a loading crane and fell in the harbor. The salt water didn't do it any good so it was dismantled and used for replacements on other planes. Ninety-nine planes finally went to the front."

Walter believes that when the complete history of the war is written, it will be shown that these 99 planes saved China during the dark days of 1940 before the United States and Britain entered the war. Thanks to these few American planes—less than three complete squadrons—the Burma road was kept clear of Japanese bombers and the Chinese industrial cities of Kunming and Chungking were protected. In the all-out Jap assault on Burma, the heroic rear guard fighting of the few planes and pilots left slowed up the Jap advance long enough to permit the forming of the defense of India.

Walter showed me a photograph of the 99th plane being assembled in the open air at Rangoon. A camera addict, Pentecost brought more than 400 pictures of Flying Tiger activities back with him from Burma. I used my best salesmanship to get some of them to illustrate this article, but Walter has them all under option to Universal Pictures, for whom he is now working.

The P-40's arrived in Rangoon packed in two huge boxes; fuselage with engine mounted in one and wings and tail assembly together with retractable landing gear in the other. The ships were set up under makeshift sunshades of bamboo and thatch and were speedily assembled by the small crew of technicians who had been arriving in twos and threes, disguised as students, tourists and sailors.

The word "tiger" does not have reference to the carnivorous beasts of the jungle. The name comes from the flashing tiger shark whose faces have been painted around the air intake on the Curtiss planes. Did the AVG boys design the wicked, flashing teeth and evil eyes of these jungle sharks? "No," says 23-year-old Ken Sanger of the AVG group. The British Tommies on the Libyan desert must be given credit for the design. These "shark faces" had pounded General Rommel's tanks with cannon and machine gun fire long before the first P-40 was unloaded on the dock at Rangoon. The AVG boys saw a picture of one of the Libyan



Chinese mechanics assemble a Tiger P-40. Armament of this ship is six machine guns.

P-40's in an English aviation magazine while in Rangoon and adapted it to their own ships. "We took a few liberties with the design," Ken told me as we were having lunch in Hollywood. "We made the teeth a bit larger because we had heard that the Japs had poor eyesight."

Don't let a quip like this make you think that the AVG boys look down on the Japanese flyers. They treat them with a healthy respect both in the air and on the ground. Nearly every fatality in the Flying Tiger group can be traced to a momentary disregard of instructions or to a hot-headed attack by a single flyer.

According to Pentecost the AVG attacks, again contrary to newspaper reports, were always made in pairs. One ship would make the attack, with the other pilot covering the attacking plane. In this way the leading flyer could concentrate on his target freely, knowing that his tail was being covered by a fellow pilot. In the event of a miss by the leading plane the other pilot could get in a burst before the target swept by.

Ask Paul Green about this. Paul dived in at 10,000 feet without waiting for his

(*Continued on page* 86)

The AVG radio operations room is a typical American installation. Two-way communications were maintained between planes and ground at all times. Operators are Yanks.

'FLIGHT STRIPS'

A typical flight strip, adjacent to highway. Wooded area provides means of concealing aircraft.

by Col. STEDMAN SHUMWAY HANKS
Headquarters, Army Air Forces

Emergency military requirements are creating a valuable heritage of airplane highways for post-war civil and commercial aviation.

THOSE flight strips with which most people in aviation have long been familiar, at least in a general sort of way, actually are coming into being now. A number are under construction; scores more are contemplated. It is entirely possible that by the time this is read the first will be in use.

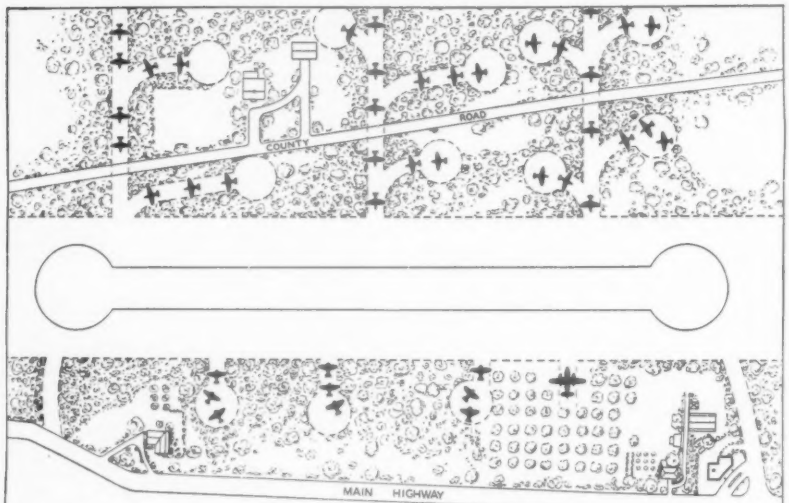
As would logically be expected, these auxiliary facilities for military and civil aviation—which in the flying age that is dawning promise to dot the entire country—are in an experimental stage just now. The first naturally are in the United States in locations which cannot be published for reasons of military security. The War Department has announced merely that the initial project is in a strategic area on the Atlantic seaboard and will be capable of handling even the largest bombardment airplanes now being flown by the Air Forces.

But flight strips will not be limited to this country. The far reaching operations of the Army's Ferrying Command demand inevitably the building of flight strips in other directions as well.

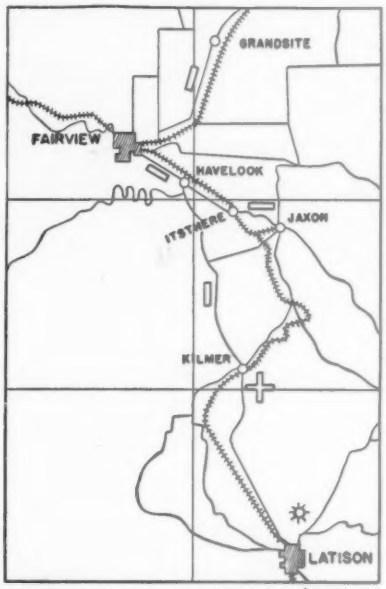
This is some of the spot news of one of the most important developments in aviation. Other new aspects will appear and some misunderstandings may be corrected in a progress report on what has been done by Federal and state governments since President Roosevelt signed the enabling legislation last November 19.

At the outset, just what is a flight strip? Reduced to its simplest terms, it is an area for the landing and take-off of aircraft, without hangars or other structures. Flight strips are located adjacent to public highways and maintained as a part of the highway right-of-way or roadside development area. More specifically, a

Originator of the flight strip idea and a trustee of the American Flight Strips Association, organized to foster the adoption of this practical means of providing landing areas quickly and economically, Colonel Hanks has been closely identified with aviation and airport development since 1916, when he qualified for Pilot Certificate No. 556. In 1917 he became a captain, then major, in Army Air Service and at one time served as commanding officer of 18th Aero Squadron. He was president of American Airports Corp. in 1927.



A comprehensive conception of flight strip development (above) illustrates the method of dispersing and concealing aircraft. Specimen area is sketched below (left).



flight strip is a landing area not less than 200 feet wide and not less than 1,800 feet long, with clear approaches located near a public highway, on public land, and developed with public funds. But for military purposes they must be even larger.

Although highways themselves have been used for emergency airplane landings, it is obvious that this expedient is impracticable except in cases of the most extreme emergency, because of the danger of accidents and the blocking of traffic.

In a very real sense, landing areas are the basis upon which aviation, civil and military, must rest. The flight strip, quickly and economically constructed, is a simple and sound answer to our urgent need for more such landing areas, which are imperatively required for defense of our land in war and for the maintenance and advancement of aviation at all times.

A flight strip capable of handling the largest bombers can be constructed at a cost averaging only about one-twentieth that of a large air base. The difference is due chiefly to the fact that a flight strip area has a single runway extending in the direction of the prevailing wind, from which taxiways lead to concealed or camouflaged dispersion points for aircraft. Another economy is the absence of large hangar and repair facilities. Construction requires but a fraction of the time necessary to build more elaborate landing areas, with considerable savings in steel and other war materials. In fact, only about 4 per cent of the entire cost is necessary for so-called critical materials.

The idea had its genesis in this country years before, but the start of Adolf Hitler's march of conquest in Europe was required to dramatize their need. Fighting to stem the Nazi flood in the Lowlands and Northern France, Royal Air Force planes of the British Expeditionary Force were hampered by a paucity of fields from which to operate and disperse for safety.

After Dunkirk, the shoe was on the other foot. Partly because of this same dearth of facilities within ready range of England, the Luftwaffe was never able in the crucial Battle of Britain to put more than a maximum of from 1,600 to 2,000 planes in the air at one time. With little success the Nazis experimented with blocking off sections of highways to serve as landing and take-off areas.

The lessons of this struggle were not lost on American airmen and enlightened legislators. After hearing testimony of such officials as Lieut. Gens. Henry H. Arnold and George H. Brett, Congress, in the Defense Highway Act of 1941, authorized the construction of flight strips largely as a national defense measure, to supplement and augment the increasing number of conventional air fields suitable for military craft.

The act authorizes the Federal Commissioner of Public Roads, in cooperation with the Army Air Forces, to conduct studies and carry out the construction of flight strips as a part of the public roads system. The acquisition of new or additional lands needed may be included as a part of the construction program, to the extent determined by the Federal Works Administrator, and Federal funds may be

(*Continued on page* 90)

A Douglas A-20A taking off from a Pennsylvania turnpike. Many instances have been recorded of satisfactory use of ordinary highways for emergency or test landings.

COYOTE HUNT

At $10 per hide, coyote hunting can be profitable. Hunters' plane is a standard "Cub" tandem trainer.

COYOTES kill $15,000,000 worth of livestock and poultry every year. They are the scourge of the western rancher, who welcomes any method of exterminating the pests. Charles Belden, widely known flying rancher, thinks the common lightplane the best hunting platform there is. Belden, who took the pictures on this page, prefers the tandem plane which enables the gunner to shoot from either side. One recent day's hunt out of the Billings, Mont., airport netted 22 coyotes, worth $10 each.

Air hunters use BB shot in 12 gauge shotgun. Lightplane's low speed makes aiming easy. Note coyote below, near center.

Coming: A Merchant Aerine

by WILLIAM M. SHEEHAN

Although comparatively slow, the great payload capacity of Ford's "Tin Goose" made it an economical, successful freightplane.

Aerial freighting may hold the solution to our merchant marine difficulties. In a careful analysis of the pros and cons this expert shows why a merchant aerine is a logical air transport development.

A practicing attorney specializing in aviation and transportation problems, Mr. Sheehan traveled through South America and South Africa several years ago to determine for himself the progress of aerial freight transportation. Further study in China, Malaya, India and Madagascar convinced him that the development of freightplanes would constitute a major phase of post-war aviation.

Since writing the accompanying article for FLYING, Mr. Sheehan resigned from Pan American-Grace Airways to enter active service with the Army Air Forces, in which he has been commissioned a captain.—Ed.

ONE of the anomalies of today is the fact that the United States, whose progressiveness in transportation is evidenced by more than half the world's paved highways, a third of the railways, a quarter of all the airlines, has yet to see commercial air freight.

Not that sky trucking hasn't been a lucrative and useful form of transportation in other parts of the world—Alaska, Canada, Central and South America, to mention a few. Hauling mining supplies over snow-capped mountains or chicle out of the Guatemalan wilds is old stuff to those who follow aeronautical developments.

Nor is it fair to say that the freight plane's usefulness is confined to Arctic wastes and impenetrable jungles, where the only alternative is dog-sled or dugout canoe. In pre-war Europe surface vehicles offered stiff competition, yet cargo constituted an appreciable portion of airline business. It was not unusual for KLM to charter planes for cargo purposes, to haul a cabin-load of tropical snakes and rare denizens of the deep to an Amsterdam zoo, or several tons of fancy building bricks from Holland to the British Isles.

True, the United States does have a kind of air cargo service—*express*. About 9,000 tons of cut flowers, fashionable gowns, newsreels, newspapers, machine parts, currency and valuable papers breezed along our airways last year. Even such diverse objects as lady bugs (to rid orchards of more harmful pests), New Hampshire snow (for a southern ski jump) and, believe it or not, fresh porpoise milk (for pharmacological research) contribute to the crazy-quilt of shipments that make up our air express traffic.

But neither individually nor collectively can these air cargo shipments qualify as *freight*. An average of seven pounds per package and a total volume of less than .0003 of one per cent of what moves in the nation's freight cars (not to mention rail express, highway trucking, river and intercoastal traffic) are hardly freighting characteristics. No matter how some may confuse terminology, our existing high-cost, high-speed air cargo service can by no means be regarded as a freight operation.

There seems to be little doubt as to the role sky trucking will fill in the future. Every form of transportation starts out as a passenger, mail and express service, then winds up by hauling heavy, bulky cargo as the major part of its activity. Thus the steamship, train and automobile each in its infancy catered to passengers, now finds freight providing 75 or 80 per cent of revenues. Air transportation is still in the infancy stage; express cargo yields less than three per cent of airline income. Whenever a freight service does come into existence, it is going to constitute the bulk of airline operations. That is inevitable, even if passenger operations continue to increase mightily.

transports every two or three years and a real buying movement started in private planes. But a greatly expanded air transportation system, with air cargo comprising the bulk of activity, *can* soak up tens of thousands of new airplanes each year. Incidentally, there will be plenty of new jobs in connection with operating these planes (the ratio of ground jobs to aircraft being something like 10 to one) and the nation's transport service will be far superior to anything we've had in the past.

Several months ago, more than 100 U. S. senators, representatives, members of the Federal Reserve Board and highway experts sat down to discuss a vast post-war project, a super-highway stretching from the Atlantic to the Pacific Ocean which would cost from $50,000,000,000 to $100,000,000,000. Although such a project would be useful in and of itself, it was agreed that the real value lay in providing employment in the immediate post-war future.

Other propositions of this character have been suggested. Doubtlessly many of them have great merit. But would not a conference for the consideration of post-war air cargo plans be of more value? The super-highway sort of project would merely soak up unemployed men. Air cargo development will also make use of a tremendous investment in aircraft manufacturing facilities and result in far less industrial upheaval.

Aside from the consideration of post-war readjustment, it would seem that a nation which has a peacetime need of 5,000,000 to 6,000,000 trucks, 11,500,000 tons of cargo vessels, almost 2,000,000 freight cars, can certainly before very long use a fleet of 50,000 or 100,000 sky trucks.

I recently returned from an extensive survey trip throughout South America and can vouch for the fact that there is a large field for air freight activity there, both actual and potential. Particularly on the west coast, where the rugged Andes and impenetrable jungles hide great natural wealth of almost every description.

It surprises many people to hear that South America contains practically all the valuable raw materials which we have been importing from across the Pacific. Tin in Bolivia; rubber throughout the Amazon valley; tungsten in Argentina; manganese from Brazil; mica, quebracho extract, quartz crystals and other items too numerous to mention. Some of our imports, from the Orient as a matter of fact, originally came from South America—rubber and quinine, for example. The reason for preferring the East Indies in recent years lay not so much in the fact that they were in a richer, more productive part of the world as that they consisted of islands and hence were more accessible than the mountain- and selva-surrounded interior of South America.

Cargo which varies from brooms to gas cylinders is loaded into single-engined Fokker used as Canadian freight plane.

No one can look at facts like the indicated annual rate of aircraft production, due to reach 125,000 planes next year, or the greater numbers of people to be engaged in aircraft manufacture than were ever employed by the automobile industry, without realizing that the cargo end of aircraft manufacture and air transportation is due for a terrific boom.

Does anyone think that with the end of hostilities our gigantic new manufacturing industry will be allowed to collapse? Or, on the other hand, that with peace we will continue building scores of thousands of fighters and bombers?

Passenger transportation can be counted upon to use up some of this manufacturing capacity, but not all of it—even if the airlines could scrap their

This 4,000-pound cargo of mining supplies waiting to be loaded into South American Ford typifies diversity of materials flown to ordinarily inaccessible destinations.

Now that we have lost, at least temporarily, our Oriental sources, we are, of course, obliged to use South American raw materials. Once we have made roadways, airports and trails into the difficult hinterland, there is no reason why we should not retain these closer sources at the end of the war. With cargo planes capable of traversing the highest mountain ranges, why should we send our ships to Asiatic mines and forests thousands of more miles away?

Even with the present scarcity of equipment and pilots, there are important air freight operations down there today. In Ecuador I have seen many a Douglas DC-2 fill up to the roof with food, fuel and supplies for some remote mine, then return with a load of nothing but coffee beans. Compañia de Aviacion Faucett of Peru has more freight than its planes can handle. This company makes its own airplanes. The 14th of a successful design went into service only a few months ago. It is not unusual for one of these homemade jobs to fly a load of Brazil nuts out of the jungle.

The Bolivians utilize a fleet of conscripted Junkers in their operations between Cochabamba, a trans-Andean city, and the cattle lands to the north. This country is so fantastically rich that animals escaped from the Conquistadores centuries ago have prospered and now number hundreds of thousands in a completely wild state. Two or three tons of charqui, a dried beef eaten by the Indians, are flown to the city; large blocks of rock salt, for salting meat and for cattle licks, are carried on the return trip.

In another service between La Paz and the mountain-locked town of Apolo, anything from canaries to the kitchen sink moves outward; cinchona bark (from which quinine is derived) fills the cabin on the way back. Quinine, to return to essential raw materials, is one of those East Indian products we're going to miss, more than 90 per cent of the world's supply having been controlled by the Dutch. Bolivia is the largest South American producer, and could produce more than she does at present. But cinchona has a way of growing back country, possibly because the more accessible stands have been pretty well worked. That's where the cargo plane comes in. It's a lot easier to fly the stuff out than cut trails through dense selvas. Sometimes they are so thick that you have to chop half a day to go 100 yards, and you need a lantern to see your way.

It would certainly seem that the Amazon valley is ripe for an air freight operation over the Andes to the Pacific Ocean. From time immemorial, whatever products have been extracted from this rich territory (a region almost as large as the United States) have moved along 2,000 miles of the winding, channel-shifting Amazon River to the Atlantic. This tedious and expensive route explains to a great extent why the Amazon's resources have been so little used. Now that hostile submarines are lurking in the steel blue waters of the South and North Atlantic, we should consider flying the more valuable trade over the Andes to the Pacific, where at this writing the naval menace seems more remote.

To be sure, there are surface routes through 16,000 foot passes of the Andes. But these are used only in exceptional cases and are unlikely to be adequately improved for years to come. Traders in western Peru still ship their goods to eastern Peru, a few hundred miles away, over 7,000 miles of water, via Pacific Ocean, Panama Canal, Atlantic Ocean and Amazon River.

About 2,300 miles up from the mouth of the Amazon (and incidentally only 350 feet above sea level) stands Peru's easternmost city, Iquitos. It has a population of 30,000. Back in 1912, however, when South American rubber brought fancy prices, it was much larger. It is a rather attractive place with good plazas, some elaborate buildings and a number of industries. Many of Iquitos' products —rubber, balata, cottonseed oil and tropical drugs—have a particular value to the United States today. Others—coffee, tobacco, rare woods and hides—are always in demand by the outside world. Why not fly these things a few hundred miles to the Pacific instead of (as today) having them shipped all the way down the Amazon to the Atlantic? One sky truck could probably get in a hundred shuttle trips on its short trans-Andean hop while a river boat made its tedious two months' journey to Pará and back.

In my layman's opinion, based upon conversations with people back in the rubber country, United States citizens will have an appreciably better chance of buying replacements for hot water bottles and worn tires if everything possible, including making full use of the airplane, is done to collect and forward latex out of South America's interior.

South America is not the only place where our post-war energies can be directed toward developing air freight. But the prospect it offers is unusually inviting. Many of those who have had a chance to study it first hand believe that the airplane is going to be to the South America of the future what the railroad has been to the United States.

Some people maintain that surface facilities in the United States are so good and extensive that freight can never hope to attain in the air the same importance it holds on the ground. This thought smacks of a horse and buggy attitude, for by the same reasoning we should not have had the stupendous growth of rail and highway freighting, since pre-existing facilities were generally considered "good enough."

The fact is, the cargo plane offers things that the train, the horse, the truck and the boat can never hope to equal: directness, mobility and a tremendous saving of time.

Surface shipments usually involve burdensome transfers from one type of vehicle to another. Within the United States, at least one shift from train to truck, or vice versa, must be expected at some intermediate point. Shipments to or from foreign countries require even more loadings and unloadings. But air freight lanes can be laid out as easily as lines are drawn on a map. There is no reason why products should not move directly from source to destination in a single hop. Land routes lead only to the water's edge, oceans to the fringes of shores that surround them, but the great body of air above provides a direct path from any spot on the surface of the earth to any other.

Able to shift easily from one route or region to another, air cargo has the great advantage of mobility over surface-bound facilities. There are no huge investments in rights-of-way to hold sky truck auxiliaries to operations that population or economic change have rendered useless or obsolete. Supposing we depended entirely upon the railroads and highways of other nations of this hemisphere (for instance, the Pan American Highway) for cargo intercommunication. Just when we had started to rely upon such a system, might not local engineering incompetence.

(*Continued on page 72*)

AIR POWER AND THE COMING INVASION

by CY CALDWELL

Unquestioned mastery of the air must be ours before millions of American and British land forces embark on invasion of continent to meet Nazis hand to hand.

ON June 7, six months after the Pearl Harbor disaster, we haven't won a single victory on land, anywhere. We haven't captured even one Jap-mandated island in the Pacific to begin to offset the loss of the Philippines, Guam, Wake Island, Hong Kong, Malaya, Singapore, the Netherlands Indies and Burma. We and the British have lost the entire opening campaign in the Western Pacific and are on the defensive in Australia and India. In losing Burma we lost the Burma Road and the most effective way to send aid to China. In losing the Netherlands Indies and Malaya we lost to the Japanese nearly all of the world's supply of rubber, all of the oil that formerly went to Australia and that was to have supplied our navies, our air forces and our mechanized armies. In losing Singapore the British also lost the control of the Indian Ocean, now open to Jap naval forces.

This is a grim picture, lightened to some extent by our victory in the minor Coral Sea naval-air engagement, and lightened still more by the recent naval and air victory near Midway Island. But that does not alter the fact that in only six months the Japs have moved in and have consolidated their positions to shut off China and seriously to threaten Australia and India.

Nor does it alter the fact that at this time, or at any time this year, there is little or nothing we can do to recapture any of the conquered territory. It seems obvious that in a war some 8,000 miles away from our shores the best we can do this year is to save Australia as a base for a future offensive and to help the British to hold India. It seems evident that the shipping situation and the United Nations naval situation render it physically impossible to transport enough troops to Australia or India and from there to stage sea-borne expeditions to recapture the Indies or Burma this year. In that war theater we are forced to remain on the defensive, our war effort limited and confined by the cargo space of freighters, limited by distance, limited by time.

However, taking the long-range view of the entire world war, there is no cause for gloom over the Japanese situation. The entire Japanese war effort, successful though it has been so far, must give any thoughtful Jap the cold shivers when he ponders that its final successful outcome is something over which Japan has little, if any, control. For it depends almost entirely upon the outcome of the war in Europe. If Germany is defeated, and all Europe (including Italy) is freed from the noose of the Nazi hangmen, then what price little Japan, with its one navy, its air force, its army? With Germany defeated, it would not matter if the Japs had Australia and New Zealand, or if they also had India; it would not count for much if Japan still had its navy largely intact, while Britain and the United States had lost half of theirs. Japan still would be doomed to certain defeat. For if Germany falls then Japan, quite irrespective of any territory it has won or still may win, would be fighting a war in a dead-end street and would come up against a stone wall. Surrounded by a victorious Russia on the north, by what remained of Free China in the west, and cut off from the world by the combined navies of the United States and Britain, Japan would have two choices: to give in and admit defeat, or to go on fighting and thus commit national hari-kari. With control of the oceans the United Nations, freed of the menace of Germany, could pour overwhelming air and land and naval forces into that distant Pacific war theater, could replace losses as the Japanese could not do, and inevitably would win the war.

Already the Japanese have grounds for grave concern about their position on the seas. They walked into a minor disaster in the Coral Sea; they blundered into a greater one at Midway Island. Without attempting to consider the consequences to Japan of this recent naval defeat and its effect upon future naval and air operations, it must bring home to the Japanese the realization that all of their conquests of the past six months were made easy by their nearness to the objectives, by their possession of superior land, sea and air forces at their selected points of attack; and by the inability of their opponents to bring sufficient force to those areas in time. Looking back and realizing how little of everything the British, the Dutch and ourselves had in the now conquered territory, the Japanese march of conquest is seen in its proper perspective. It was not the triumphal progress of supermen; it was simply the determined infiltration of a horde of Japs against always numerically inferior forces. It will take time to readjust that balance of forces in our favor. Meanwhile in Australia and in India we must remain on the defensive, building up for the eventual offensive that will regain every inch of territory the Japs have taken, including all of that in China.

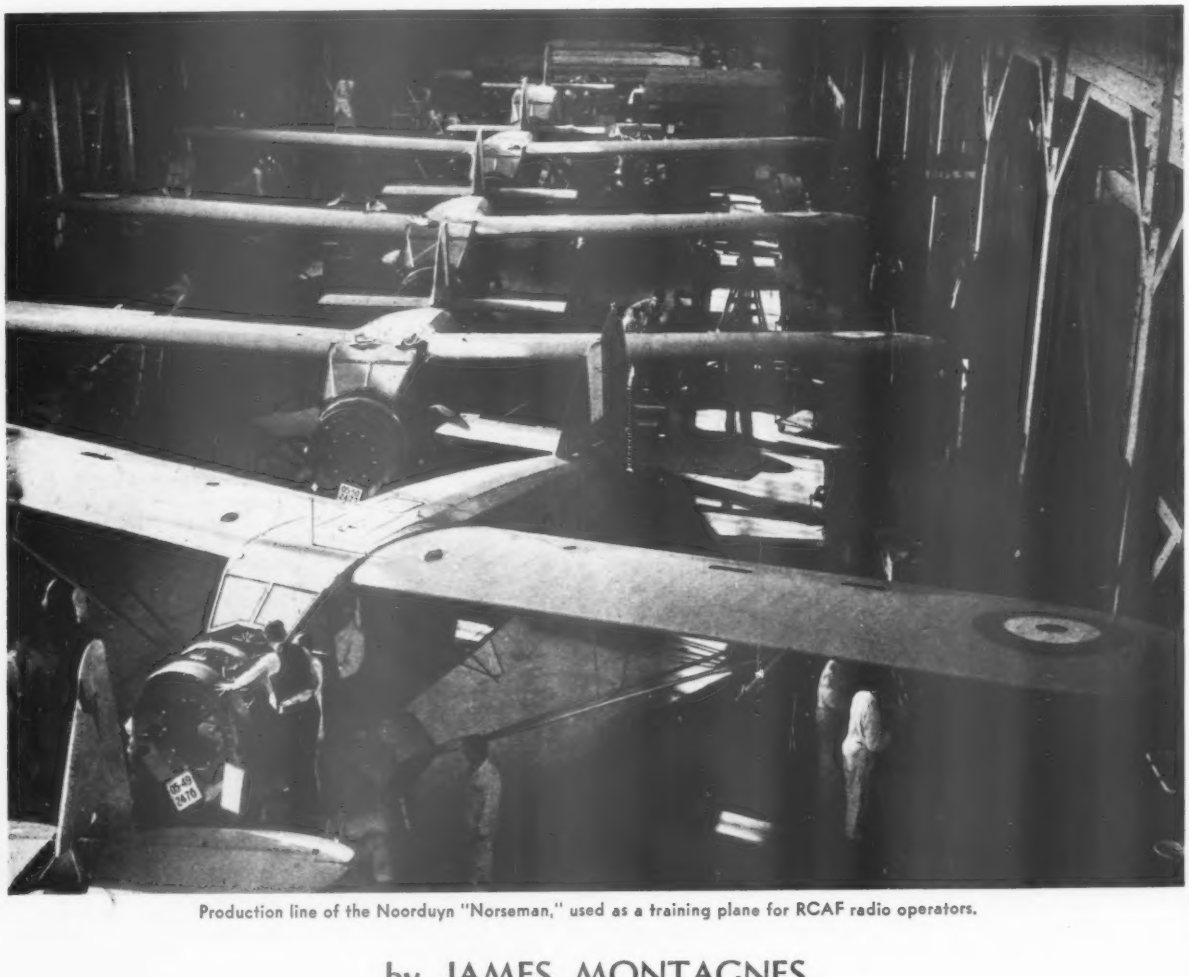
The keystone of the World War is Germany. Knock out Germany and the entire Axis war structure falls. No war ever has been won only on the sea, or in the air. They have been won at last by land battles. And we have an Army. By now we should have enough of an Army to get in some telling blows on land—and get them in where they will do Germany the most harm and our side the most good. We've been at war with Germany for half a year, and so far an American soldier hasn't fired a single shot at a single German soldier.

That this static condition is not going to last indefinitely was made plain by Gen. George Marshall, Chief of Staff, U. S. Army, when he told West Point graduates:

"Today we find American soldiers throughout the Pacific, in Burma, China and India. . . . They are landing in North-

(*Continued on page 76*)

Canada's Warplane Industry



Production line of the Noorduyn "Norseman," used as a training plane for RCAF radio operators.

by JAMES MONTAGNES

Our northern neighbors have increased production to the point where Canadian output now helps the U. S. meet its Lend-Lease obligations.

WHEN Canada went to war in September, 1939, less than 1,000 persons were engaged in the Dominion's aircraft industry; 160 aircraft of all kinds, valued at about $3,350,000 were built in the previous year. By the beginning of 1942, Canada employed in its aircraft industry nearly 35,000 men and women, and stepped up its output of training, fighting and bombing planes to 70 per week. Floor space of Canada's industry had grown from less than 400,000 sq. ft. before the war, to nearly 4,000,000 sq. ft. by January, 1942. Canada has ordered, since the start of the war, more than 8,000 airplanes, practically all from her own factories. So rapidly and efficiently has the Canadian industry grown, that now its factories have started working on orders for trainers to be shipped to the United States for shipment abroad under the Lend-Lease plans.

These are the bare facts about the growth of Canada's aircraft industry, a fledgling when war broke out. While Canada used the airplane extensively since the last war in opening up its vast hinterland, it bought most of its aircraft from the United States. Canadian factories had licenses to build American planes in the Dominion, but most of the planes built were lightplanes, a few cabin jobs, and a few military types for the Royal Canadian Air Force. Output rose slowly from 18 in 1934, to 160 in 1938. Since then, Canada has repeated its job of the first World War, only on a larger scale. Then Canada built 2,900 two-seater fighters in hurriedly assembled plants at Toronto. Now the Dominion's industry is building planes at Montreal, Toronto, Fort William, Fort Erie and Vancouver; has set up parts factories elsewhere, and is making everything for the modern airplane except engines and a few instruments.

With orders for $200,000,000 in aircraft on the books, Canada's aircraft industry will soon cut down the number of airplane types it is now building. American-born Munitions and Supply Minister C. D. Howe said in Ottawa in September, 1941: "We are building 13 different types of aircraft. We hope, however, ultimately to narrow these down to six or seven." The smaller group consists of the Fairchild *Freshman*, an

elementary trainer; the North American *Harvard*, a single-engined advanced trainer; the Avro *Anson*, a twin-engined advanced trainer; the Consolidated *Catalina*, a coastal reconnaissance amphibian; the Bristol *Bolingbroke*, a bomber; the Avro *Lancaster*, a four-engined bomber; and a secret plane.

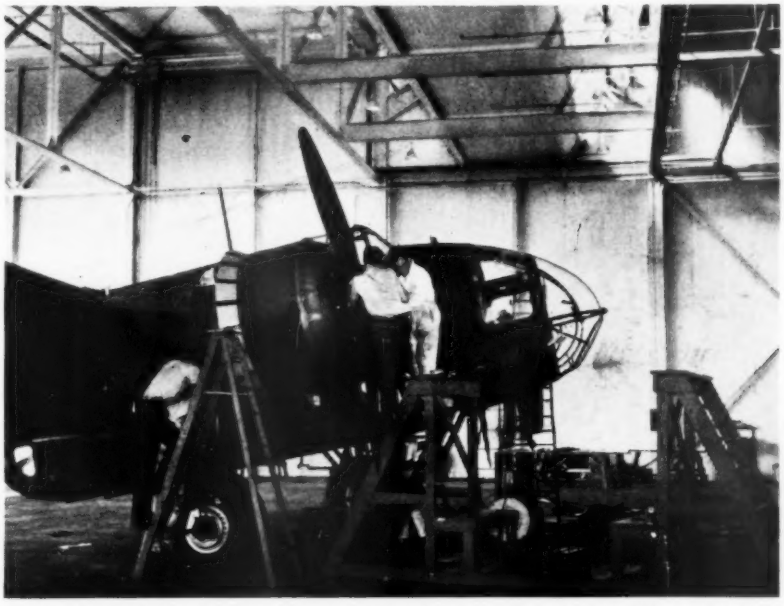
Here is what, with latest production figures, Canada's aircraft industry has been busy building during the past year:

Handley-Page *Hampden* medium, twin-engined bombers: parts for this six-ton bomber with 69-foot wing span are manufactured by six companies. The parts are then shipped to assembly plants of Canadian Associated Aircraft at Toronto and Montreal, where they are assembled. The engines come from Britain, the planes are on order for Britain. The first order for 80 of these planes was given in November, 1938, and was doubled two years later. Production is now 15 per month. The plane has a maximum speed of 265 m.p.h., a range of 1,700 miles, and carries two tons of bombs.

Vickers *Stranraer* flying boats: these are twin-engined reconnaissance flying boats built by Canadian Vickers at Montreal for the RCAF for coastal patrol and convoy duties. Already obsolete, the 46 of these planes originally ordered in 1938 were to be finished by the end of 1941 at the rate of five per month. The plane has a speed of 165 m.p.h., a range of 1,250 miles, weighs nearly six tons, and can carry nearly a four-ton load. When the order was completed it was to be succeeded by the Consolidated PBY *Catalina* flying boat which was scheduled to be in production early in 1942 at the Montreal plant, and at the Vancouver plant of Boeing Aircraft of Canada.

Consolidated PBY *Catalina* flying boat: This ship is already seeing patrol and convoy service with the RAF. Canada has ordered 50 of these from the Consolidated Aircraft plant at San Diego, and will build its own at Montreal and Vancouver. The plane is faster than the *Stranraer*, has a speed of about 200 m.p.h., a range of 4,000 miles and is larger. It will be used for coastal defense, and convoy and patrol duties by

Now obsolete and replaced by the Fairchild M-62, more than 400 of these Fleet "Finch" elementary trainers were built in Canada during the first year of the war.



Canadian-built Handley Page "Hampden" bombers are powered with 1,000 h.p. Bristol "Pegasus" engines (made in England), have 1,700 mile range with two-ton bomb load.

Also built in Canada is this Avro "Anson" bomber. Note fluted cowling on its 350 h.p. Siddeley "Cheetah" engines.

Standard for advanced training in the RCAF, North American "Harvards" also are produced in Canadian plants.

Production of "Bolingbrokes," Canadian version of the Blenheim IV, is 15 monthly.

The obsolete "Stranraer" (above) has been succeeded by Consolidated's PBY "Catalina."

The Canadian-built Westland "Lysander" is designed for utility work with the Army.

the RCAF. Canada has placed an order for 94 of these twin-engined amphibians.

Bristol *Bolingbroke* reconnaissance twin-engined bomber: Fairchild Aircraft of Canada has an open order for these planes being built at its Montreal plant for Great Britain at a current rate of 15 monthly. This bomber and night fighter can fly 295 m.p.h., has a range of 1,900 miles and carries a half-ton bomb load. It is powered by English Bristol *Mercury* or American Pratt & Whitney engines.

North American *Harvard* advanced trainers: these standard trainers, with a speed of 210 m.p.h., are being built at Montreal by Noorduyn Aviation, at a current rate of about 20 per month, which is to be stepped up to 50 per month. They are used by the RCAF. A recent order of 500 of this type was given the Canadian company by the United States for shipment to countries receiving Lend-Lease aid.

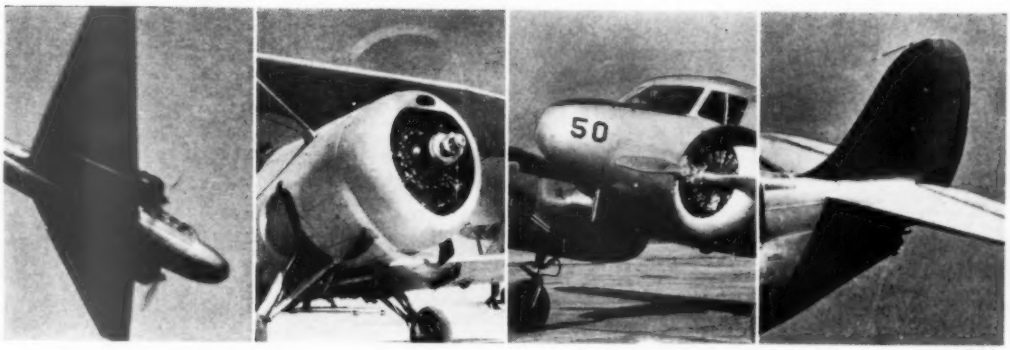
Hawker *Hurricane* fighter: production of this famous British single-seater, 335 m.p.h. aircraft started in Canada in 1939, with the first one tested in January, 1940. The first order of 660 of these planes was to be completed by end of 1941, at the Fort William, Ontario, plant of Canadian Car and Foundry. A second order has been given the factory for 500 to be completed by September, 1942. Production at present is 15 weekly, to be stepped up to 25 weekly.

Fleet *Finch* and *Fort* trainers: the *Finch* is an elementary trainer, 430 of which have been produced for the RCAF. The *Finch* is now obsolete, the last of the order having been delivered early in 1941. It is replaced by the Fairchild M-62 to be built in Canada. The Fleet *Fort*, also built by Fleet Aircraft at Fort Erie, Ontario, is an intermediate trainer with a top speed of 190 m.p.h. An order of 200 of these trainers has been placed.

De Havilland *Moth* elementary trainer: this is the Canadian version of a British plane, and it is being built at the de Havilland Aircraft plant at Toronto. Close to 800 of these trainers have been ordered

(*Continued on page* 108)

FOR IDENTIFICATION



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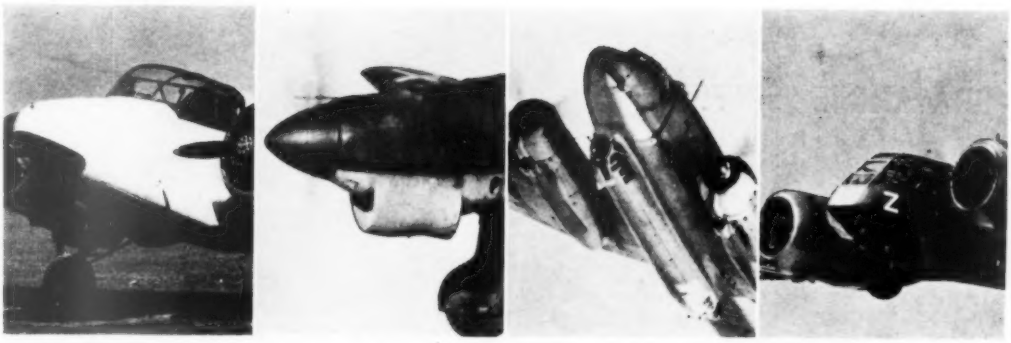

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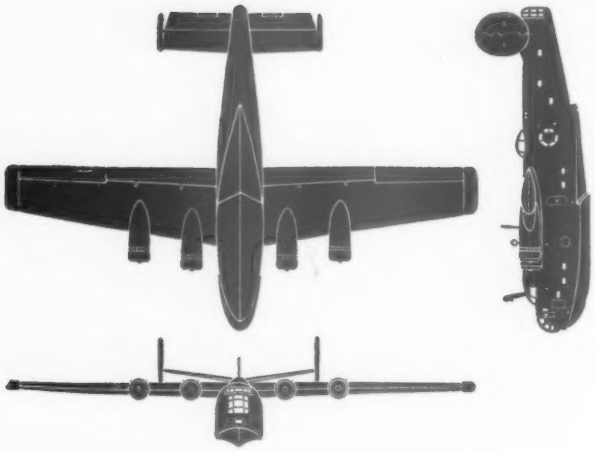
THE ability to promptly and accurately identify aircraft on sight played a vital part in the defense of England against the Luftwaffe. Thousands of aircraft spotters spent endless hours in learning to differentiate between friendly and enemy aircraft. It is just as important that Americans learn to tell at a glance whether that plane flying overhead is their own or an enemy craft. Only by study and concentration can the "man in the street" learn the definite characteristics and details which differentiate one plane from another. In the eight panels above are shown parts of different aircraft. Each panel, however, emphasizes one feature which will identify that particular plane. By instinctively recognizing such features one becomes an expert "spotter." Check your identifications with the correct list, published below, and then memorize each detail.

The planes are: 1. Mitsubishi Navy Type 96; 2. Curtiss SBC-4; 3. Cessna T-50; 4. Curtiss SB2C; 5. Airspeed "Oxford"; 6. Junkers Ju-87; 7. Focke-Wulf "Kurier"; 8. Bristol "Blenheim."

CONSOLIDATED "CORONADO"

Patrol Bomber

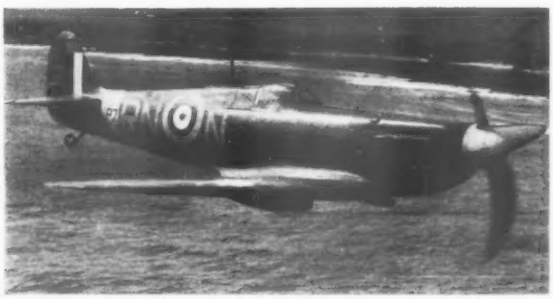


PERTINENT FACTS: Biggest patrol bomber in the U. S. Navy, the *Coronado* is known technically as the PB2Y; it resembles somewhat its smaller, older brother, the twin-engined *Catalina* (PBY). Official specifications for the *Coronado* had not yet been released as this went to press. Wing span is approximately 110 ft., being only slightly greater than the *Catalina*, which is known to be 104 ft. The *Coronado* is a particularly long-range aircraft and is ideal for operations over the vast Pacific. Horsepower of the four air-cooled engines is not given. Heavily armed and armored, this ship has gun turrets in the nose and tail as well as on each side of the fuselage. Incidentally, the color scheme shown in the above photograph has been replaced with new camouflage.

WHAT TO LOOK FOR: Note especially the twin-ruddered tail assembly, with its marked dihedral in the horizontal fin and elevator. In the overhead view this tail assembly can be spotted quickly, as can the four engines and large hull. The wing follows the same general plan as that on the *Catalina*, although it differs somewhat in shape, having a straight trailing edge, with pronounced taper on the leading edge. The novel retractable wing tip float perfected by Consolidated can be seen on the *Coronado*. The bulky, blunt rear gun turret is quickly recognizable.

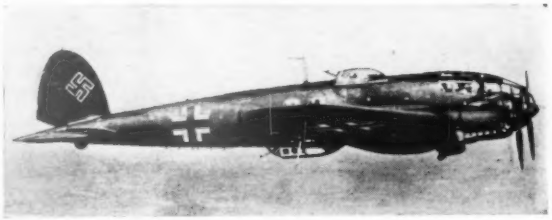
SUPERMARINE "SPITFIRE"

Intercepter Fighter



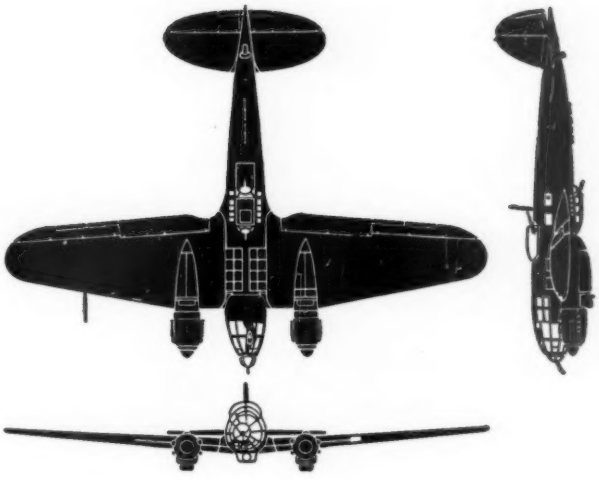
PERTINENT FACTS: One of the world's most famous fighting planes, the *Spitfire*—now going into its sixth modification—still is one of the most widely used fighters in the RAF. The silhouettes at left are of the currently used *Spitfire V;* the photograph above is the model which immediately preceded the current model, differing only in that it is the standard eight-gun intercepter. The *Spitfire V* carries two 20 mm. cannon, plus four machine guns. Its Rolls-Royce liquid-cooled engine develops approximately 1,100 h.p. Wing span is 36 ft., length 29 ft. and height 11½ ft.

WHAT TO LOOK FOR: Most quickly recognized feature of the *Spitfire* is its graceful, elliptical wing, tapering out to the pointed tips. In the overhead or side view, the *Spitfire V* clearly shows its two projecting 20 mm. cannon. Also to be looked for is the protruding oil cooler intake and the smaller air scoop under the engine at the leading edge of the wing. The landing gear retracts outward and slightly to the rear, fitting flush into the wing. Note, too, the protruding engine exhaust stacks, designed to utilize the jet propulsion effect created by the plane's high speed.



HEINKEL HE-111K

Bomber-Torpedo Plane



PERTINENT FACTS: Germany's most widely-used bomber type, the Heinkel He-111 is used for everything from long-range bombing to torpedo-carrying and reconnaissance. The first He-111's were considered by RAF fighter pilots to be "clay pigeons." However, after losing hundreds of the poorly-armed and armored Heinkels, the Germans modified the type extensively. The current model carries six 7.9 mm. machine guns or five machine guns and one 20 mm. cannon (in the belly "dust bin"). Wing span is 74 ft., length 53.7 ft., height 14 ft. Engines are two Junkers *Jumos* of 1,150 h.p. each. Normal gross weight is 25,500 lbs., normal bomb load 1,760 lbs., although the He-111K can carry an absolute maximum overload of 2½ tons of bombs. Top speed at 17,000 ft. is 260, cruising speed 225, range 1,540 miles. Two novel features: the He-111K now is being built for assisted take-offs (rockets or catapult); sometimes either an additional machine gun or a grenade-thrower is fitted in the rear tip of the fuselage and operated remotely.

WHAT TO LOOK FOR: The cantilever wing tapers on both edges outward to the rounded tips. The wing root, at the trailing edge, has a quickly recognized cut-out indentation. From the side, the He-111K is easily spotted. Instead of the usual pilots' cockpit, the German bomber has a completely Perspex-enclosed nose, in which are the pilots as well as the nose gunner and bombardier. Note that the nose gun is in an offset mount. The dorsal and ventral gun positions project noticeably from the fuselage. Landing gear is fully retractable, folding backward into the engine nacelles. On the later models, the tail wheel retracts. The tail assembly is elliptical in form.

NO PHOTOGRAPH AVAILABLE

MITSUBISHI 00 (ZERO)

Navy Fighter

PERTINENT FACTS: This is the Jap fighter most respected by U. S. Army and Navy flyers in the Pacific. It also is the most shot-down. American flyers quickly tabbed the Zero's shortcomings: no armor protection for pilot or fuel tanks. A powerful, maneuverable plane, the Zero nevertheless is highly vulnerable to U. S. Grumman, Curtiss, Bell and Lockheed fighters. According to the British Air Ministry, the Zero is powered with a 14-cylinder air-cooled engine of 900-1,200 h.p. Top speed at its normal flying weight (5,140 lbs.) is 315 m.p.h. at 10,000 ft. Service ceiling is 36,000 ft. and its range is 590 miles; addition of a belly fuel tank will increase the range to 1,600 miles at 160 m.p.h. Normal cruising speed is 265. Wing span is 39.4 ft., length 28.4 ft. Armament consists of two 7.7 mm. machine guns and two 20 mm. cannon.

WHAT TO LOOK FOR: The Zero bears a marked resemblance to Germany's new Focke-Wulf Fw-190 fighter. The Jap ship is a conventional low-wing, cantilever monoplane. The wing tapers evenly along both edges to the rounded tips. At the root the wing is fully faired back along the fuselage, the fairing being plainly visible at the trailing edge. Landing gear and tail wheel retract, the former folding directly inward and flush with the wing. The two cannon can be seen protruding from the wing's leading edge. The cockpit is covered by a conventional hatch. Note that the tail surfaces also are tapered.

Even the lobbies of sumptuous Miami Beach hotels are utilized as classrooms by the Army Air Forces.

SWANK SCHOOL

by ROWLAND CARTER

Florida's gilded winter playground has adopted khaki as its fashion plate. Exodus of dowagers and playboys marked entrance of the Army.

FLORIDA'S Miami Beach is the answer to the still widely prevalent notion that the Army, even in wartime, tends to be hidebound and hamstrung by red tape.

In that gilded winter playground a new West Point for the Air forces was all but conjured up in four days. Three months later an initial graduating class of nearly 500 former enlisted men received commissions there as ground officers. And that is only by way of introduction to what is happening to one of the most celebrated haunts of glamor and play.

Miami Beach has gone to war in spectacular fashion. Visitors are still able to recognize the place but gasp at the contrasts. Men in khaki sleep in $20-a-day hotel rooms. Whole blocks of hotels on the southern end of the beach now are barracks. On palm-lined Collins avenue an erstwhile automobile showroom is a busy office for military clerical work. A onetime shop is an Army post office. One floor of a famous hostelry has been transformed into a hospital.

Half or more of the big resort still is devoted to rest, relaxation and the pursuit of pleasure; but not the portion taken over by the Army Air Forces. Everything there is in wartime dead earnestness.

It was on a Thursday in late February that the Army and the resort people got together on the plan to use hotels as barracks and classrooms and restaurants as messhalls. The following Monday, lugging barracks bags and other gear, the Army started tramping into deep-carpeted lobbies and passed departing guests flanked by luggage-laden bellhops. The Army—especially its aerial arm—can move fast when a matter of urgent importance is involved.

When the plunge into war brought the decision to expand the AAF into a million-man force by the year's end (and to double that by the close of 1943) it was obvious that thousands of additional nonflying officers would be needed, aside from tens of thousands of pilots, bombardiers and other actual combat person-

nel. Speed was imperative, and that is largely why Miami Beach was chosen as the site for a great training center for officers required for such phases of military duty as transportation, supply, mess and personnel administration.

Instead of having to wait three months or more for completion of a costly, hurriedly-constructed cantonment, the Air Forces Technical Training Command found at the resort ample facilities ready made for quick conversion. The winter season was nearing an end and the hotels were facing an ominous threat of ruin because war was playing hob with transportation and keeping people too busy for play. The Army's need was the resort's opportunity and the result was a "natural."

The first of three major training operations centered at Miami Beach to start functioning was the officer candidate school, the others being the officers' training school for men already commissioned, and the replacement training center for enlisted recruits. All were headed up by Brig. Gen. Ralph H. Wooten as commander of the Miami area, first district of the technical training command, with Col. Horace B. Smith as chief of staff.

The initial class of the officer candidate school was composed of men who had had from three months to seven years service and were hand picked on the basis of their proven mental and physical qualifications and demonstrated leadership. Three months of intensive cramming made them officers the AAF could be proud of.

Col. James S. Stowell, the commandant, was able to assert that "these men are ready for duty anywhere" after they had undergone a rigid schedule of training that began at 5:40 o'clock each morning and continued until 10 at night.

Under Maj. James R. Luper, director of training, they were given instruction in 33 classroom subjects and field exercises and familiarized with the basic organization of the Army and its administrative policies. Dove-tailed with close-order drill on parade grounds (which only recently had been golf fairways) and with strenuous physical training were such studies as command and staff functions, employment of aviation in the Army, safeguarding military information, air and combat intelligence, military sanitation and first aid, defense against air attack, military courtesy, discipline and customs.

Outstanding football coaches and players help realize the school's purpose to bring the embryo ground officers to a peak of physical fitness, hardened and ready for any climatic conditions. Les Fullbright, former coach at Birmingham-Southern College and Sewanee University, was put in charge of physical training, with such assistants as Leonard Frank, former Rutgers fullback, Jim Purvis, recent backfield coach at Purdue, and Paul Amen, former Nebraska end mentor.

A separate institution is the Air Forces' officers training school, which is solely for men commissioned from civil life because of their special experience in such capacities as engineering, the supervision of technical personnel, direction of war plant operations and the supply and

Restaurants as well as hotels have been taken over intact for the Air Forces officers and men. Use of resort has effected a great saving of time and money.

Although their quarters are a bit congested and "room service" is self-provided, enlisted men at Officer Candidate School agree that "camp was never like this."

management of large Army mess halls.

Officers attending this school are given a six-week physical training and refresher course to fit them for duty in ground administrative and highly specialized posts. The program, directed by Lieut. Col. William A. Roberts, calls for two hours daily of military drill, two more hours of exercise and physical conditioning, plus additional periods of recreational athletics and classroom work. Graduates are assigned to duty in various divisions of the AAF.

Largest of all the military activities at Miami Beach, in point of numbers, is the Air Forces replacement training center, under Col. Mert Proctor, commanding officer. Through this center, which opened early in April, pass thousands of troops each month. Here enlisted men, mostly raw recruits, are classified, immunized, given basic military and physical training and provided with corrective medical treatment where necessary.

Classification of men is an intensive and searching process. A classification officer interviews each new arrival, questions him at length about his background in civilian life, applies scientific tests to record special aptitudes and observes generally his mental reactions so that he may be quickly and efficiently trained by the AAF in the type of duty for which he is best qualified.

Men who go out from the replacement center to technical training schools are those who eventually become the mechanics and maintenance experts who literally "keep 'em flying." Their abilities must be developed as speedily as possible.

During the month or more that he trains at Miami Beach the new enlisted man receives his primary physical conditioning. He goes through the basic school of the soldier and spends hours each day in calisthenics and competitive sports to harden him in the fastest possible time. Such training continues after he is sent to a special training school, but it is at the replacement center that his fundamental indoctrination takes place.

One factor common to all three training operations of the technical command in the Miami area is health and body building. A high level of physical fitness is a tradition of the service. While flying personnel must possess this attribute to a more exacting degree than their mates on the ground, it is necessary to all. Climatic advantages therefore figured prominently in the Army's choice of Miami Beach.

For drill, calisthenics and sports, a municipal golf course and several parks are being utilized, along with designated sections of the beach. Where golfers tramped the fairways only a few months ago, a difficult course for physical drill has been put up. Facilities were created for volley ball and other team games.

Florida's climate is advantageous in many ways in helping build up the Air Forces in a hurry. Work and exercise under a hot sun is one of the quickest possible means to achieve physical fitness. It serves to prepare men, mentally as well as physically, for strenuous duty

(*Continued on page* 109)

FROM HEADQUARTERS

by Lieut. Col. HAROLD E. HARTNEY (A. F. Res.)

Harold E. Hartney

THE Japs may have a task force at sea in the Northwest Pacific; the Huns may be sinking three merchantmen per day in the Western Atlantic; 3-A selective service men may be reporting for service; this globular war may be creating a dozen AEF's and worrying some of us as to how we will feed them but there is a healthy spirit of optimism here in Washington that cannot be suppressed. Columnists have frowned on this, preachers from the pulpit have even condemned it as being unpatriotic but still this surge of good old American confidence which some people decry is here and your correspondent thinks it is good, healthy and stimulating.

For we Americans, thanks to Pearl Harbor, are not the optimists described by Elbert Hubbard as being goosefleshed, teeth-a-chatter neurotics trying hard to be brave; we are just common or garden variety people who now are pretty well united. We realize that Hitler has missed the boat, that he has lost his opportunity and used up completely his edge of time and we are at last getting into our stride on quantity production, we have suffered but we have not perished, we have at times failed but the Axis "ain't seen nothin' yet."

Take for example our airplane production. When the President put forth his 50,000 a year plane production program two years ago at least 90 per cent of the aviation experts thought it was fantastic. Today it is a reality.

Last October when a writer in this magazine urged a million-man Army Air Force, he was scoffed at by many. Today it is a reality, yet it is but half of what it will be this time next year.

When another in this same book urged the employment of England as a base so that we might, if need be, use it as a jumping-off base it opened a veritable Pandora's box. "Why should we defend England under such a pretext?" said one. "Not a single Sammy will ever leave our shores even to act as a mechanic on such planes," said others. "We won't be able to hide our airplanes there away from the devastation of the Luftwaffe even if we do try it," said many. "It will be all over before we can begin to produce aircraft"; "We should keep our airplanes here for the defense of our own country before we start looking abroad," chimed in others. "Attack on our shores and in our coastal waters? Nuts!" said the armchair strategists.

And they were often located right here in Washington, too. Where are they today? They are hedging, but to a good end. They are ashamed of their lack of foresight a year ago but in direct proportion as they are abashed, they are now ready to get in line and become part of the great new American machine of regimented democracy with its dander up, with its determination unflinching—and unsullied.

* * *

It is good for Washingtonians to get out of Washington now and then. Statesmen often do; bureaucrats never. Down in Burlington, N. C., where Americans are 100 per cent and Quislings only come out at night, I recently ran into a most interesting organization for offense. Five hundred young men, all hard working, some soon to be drafted, and some not, had grouped themselves into an "organization for offense." They didn't like the word defense and so gained the impression that the Office of Civilian Defense was too slow for wartime and so went out and bought themselves new uniforms, set aside nights for drill, oiled up their old Winchester shotgun or blunderbuss and performed their nightly task. Members of a spontaneous organization and with blood in their eye, they were an inspiration to the sojourner from Washington. They turned out for a patriotic mass meeting and parade and what one cannot understand to this day is how it was that in a town of 15,000 a total of 25,000 healthy, happy and well clothed citizens cheered the parade along the main street. Whole counties must have come over, gas-rationed or not.

There is cause for comfort and optimism now for no country in the world has ever in all history been as far along as ours after having been at war only six months.

* * *

Contributing in no small measure to our Army Air Forces' effort have been the Army Air Forces public relations officers and men, including a good friend of this department, Lieut. Col. Charles Wayne "Chuck" Kerwood on Col. Art Ennis' staff. "Chuck" on some days makes as many as 10 speeches. Possibly you have seen him in some of the plants where recently he has been introducing the airman, Capt. Hewitt T. Wheless, whom the President lauded recently on a national hook-up, and Capt. William J. Bohnaker of the Army Air Forces who destroyed two Jap transports. Chuck now is out with a bunch of QB's on the west coast making a film that will make Goering weep—if he's alive to see it.

* * *

We hear daily of our boys and of their escapades literally from all over the world. A double DSC man of my World War I command was taking a short train journey in the Far East the other day. Only two columns ago he was helping me write my piece. Some bandits boarded his train. My friend, an ace of World

(*Continued on page* 69)

The 'Air-Conditioned' Generation

by

Dr. JOHN W. STUDEBAKER
U. S. Commissioner of Education

Emergence of flying as prime factor in war has shown that the aeronautical training of America's youth should start in our public school system.

SOMEWHAT obscured by the war's daily drama is the national undertaking to gear the schools into the urgent effort to assure aviation supremacy for the United States, both for early victory in the present conflict and during the air age that is dawning.

It is an effort to air-condition quickly an entire generation, through the great mass education system of the nation, which is without precedent in several major respects. Its significance undoubtedly will rapidly unfold.

Less than six months after Pearl Harbor, the 26,000 public high schools are embarked on an undertaking whose many ramifications involve:

Immediately, a substantial contribution to the speedy expansion of the Army and Navy air forces by helping supply an adequate flow of qualified candidates for training as flyers.

Looking to the future, reshaping the study and training of millions of students in the secondary schools to give full recognition to the crucial importance of aviation, which at last has become clear to all of us.

As a preliminary to their larger role, the schools were called on to supply 500,000 carefully made scale models of United Nations and Axis warplanes to the Navy for training purposes.

It must be admitted that our schools have, generally speaking, been slow to capitalize on the interest of youth in aviation. During the years when war clouds seemed to lower only over Europe and Asia, we were too prone to adhere to our academic traditions.

In Nazi Germany, pupils in elementary schools have been learning to build model planes since 1934. In secondary schools they build and learn to fly gliders. From there they go on to become pilots of power planes.

In number, if not in thoroughness, the Russian effort to develop reservoirs of air-conditioned youth from which to draw for military pilot training exceeded those of the Germans.

It was not until 1939, that this nation really began to do anything similar. Since then the Civilian Pilot Training Program of the Civil Aeronautics Administration has developed some 75,000 flyers.

Now, under the impetus of war demands, pre-flight aviation instruction is being extended into the secondary schools, on a scale that gives hopeful promise for the future.

How air power is deciding the fate of nations and of the world for generations to come has become familiar to all of us, in a general sense. Air power vanquished Poland and France, saved Britain's island fortress and enabled the Russians to fight on into the winter. Air power will win the battle of the Pacific.

Distances of this terrestrial globe seem to shrink as the belligerent airplane increases its range. American bombers can fly from Canada; refuel and bomb-load in England; fly eastward to drop bombs on Berlin and land beyond the Urals, there to reload and fly back to Britain, dropping another load of bombs in transit. As Maj. Alexander de Seversky, indefatigable exponent of air power, said in an address a year ago: "The 8,000-mile bomber simply cancels out the rhetoric of isolationism."

The actual onslaught of war was required nevertheless to bring home to the American people the real meaning of the alternative to "fly or die" and to usher the millions in the schools all the way into the air age.

The United States is embarked upon a colossal aircraft production program. President Roosevelt's announced goals of 60,000 planes in 1942, and 125,000 in 1943, can be and will be achieved. Already our airplane production rate has increased 50 per cent since Pearl Harbor. It will not be long before on every front we shall have swarms of fighters rising to pour their wrath of steel into the planes of the enemy, and formations of bombers to bring death and destruction to hostile navies and industries.

These planes that are rolling off assembly lines will require flight crews of pilots, navigators, bombardiers, radio operators and gunners, along with ground crews and mechanics and maintenance specialists. Training programs for air force personnel must keep pace with accelerating production.

That poses a serious problem for the Army and Navy. So vigorous has been their recruitment of men between the ages of 18 and 26 that the reserves of men who can meet the physical and educational requirements of the air services are not as large as they should be—a problem which the schools are setting out to solve.

The Army already has removed its formal educational requirements for air cadet training, depending rather upon a screening test to determine educational achievement and general intelligence of trainees. The Navy has had to consider following a similar course. It became clear that the urgency of need for pilots might lead to some minor reductions in the physical standards for flight training.

To fill an estimated quota of approximately 100,000 pilot trainees needed within the year, the Army and Navy are turning to the physically qualified youth of this year's 500,000 high school boys being graduated in June. But even if those youth meet the physical tests (and in the past only one in 10 applicants has passed them) not all of them are likely to get through their preliminary ground school training because many of them are weak in physics and mathematics.

This situation imposes an immediate responsibility on the high schools. The Army and Navy need their help in giving refresher courses in science and mathematics to reduce the mortality of physically qualified youth in the preliminary ground school pilot training.

The U. S. Office of Education, the Federal Government's link with the school systems and high schools of the country, and representatives of the Army and Navy went to work early in the spring to set up practical means of answering this question: What could the high schools do immediately to help the pilot

(*Continued on page* 94)

Fiery bombs are threat to plants.
Here Douglas workers watch tests.

FIGHTING THE INCENDIARY

by

EDWARD CHURCHILL

Aerial missiles generating heat of 4,550° may shower down from enemy planes, but California aircraft plants believe they have solved problem of protecting life and property.

WITH Southern California virtually an armed camp and with the ears of sound detectors reaching out over the Pacific, this defense area is ready for anything that flies—meaning, specifically, the hornets from Japan with the emblem of the rising sun on their wings and fuselages.

Revetments six feet thick at the base and two feet thick at the top, where airplanes singly can find shelter, are rising on all airports. Army guards patrol aircraft factories. Adjacent to these factories are military units, ready for instant action. On the roofs of the aircraft factories bristle machine guns and anti-aircraft guns, waiting and ready, pointing into the sky.

Reaching down from San Francisco (headquarters for the Fourth Interceptor Command) like giant fingers, are the communications channels, incorporating airways traffic control. And, at the ends of these fingers, are observers, keeping their vigil to warn of attack.

Geared into this set-up are the "alert" and "black-out" signals, ready to throw a black blanket over 5,000,000 people. Night time finds planes high in the sky, "guinea pigs" of the Air Forces, who, simulating a Japanese attack, permit countless searchlights to limn them against the stygian skies.

Integrated with the ever-ready airports, crowded with everything from Lockheed P-38's to Curtiss P-40's, from observation planes to giant bombers, is the coast artillery, ready to throw a wall of steel out into the Pacific. And in the parks, in buildings heretofore deserted, in the hills and in all available places are infantry battalions, ready for ground-strafing should a Jap landing party make the grade.

All this is what Southern California is doing to fend off attack by air or by sea —and the betting gives the odds to an air attack. California fears bombs—but the greatest fear at the present time is that dirty little magnesium missile from the skies, the incendiary bomb. Southern California is building planes, thousands of them. And it doesn't want its work either hampered or destroyed by more thousands of tiny bombs generating a heat of 4,550° F. and capable of burning through even light steel plate.

Douglas Aircraft and other large manufacturing companies therefore are con-

centrating on educating workers in the immediate extinguishing and destruction of the fiery little devils of the sky. The Los Angeles fire department, co-operating with the factories, has given many demonstrations before workers in the hope that when trouble does come they will be able to meet it.

Not only that, but an appeal has been made to aircraft companies to assign to this work any employee who believes he has a solution to the problem. Lockheed issued such an appeal with remarkable success. The result was a new method of extinguishing magnesium fires in aircraft plants which, if put into general use, might prove the most efficacious means yet devised of combatting the devastating effects of incendiary bombs. The contribution was made by Vega Aircraft personnel.

It must be remembered that bombs dig holes and damage surrounding territory for a short distance. A direct hit will wipe out a bomber on the ground. But no ordinary bomb can do the damage that one incendiary can do, sweeping an entire factory with flames, and putting several thousand men out of work after destroying not only aircraft but the machinery which is used in the fabrication of aircraft. Nor can one minimize the loss of man-hours which would result from flames sweeping through the huge residential districts (housing workers) which surround all of the Southern California aircraft factories. It is one thing to fill up a hole in the ground or the floor of a factory and then resume work; it is another to rebuild huge plants while thousands of skilled workers stand idle.

How many incendiaries could fall on a factory, burning through roofs, falling onto dies and tools, half-completed airplanes, designing rooms, general offices and airport runways? One authority gives some startling figures:

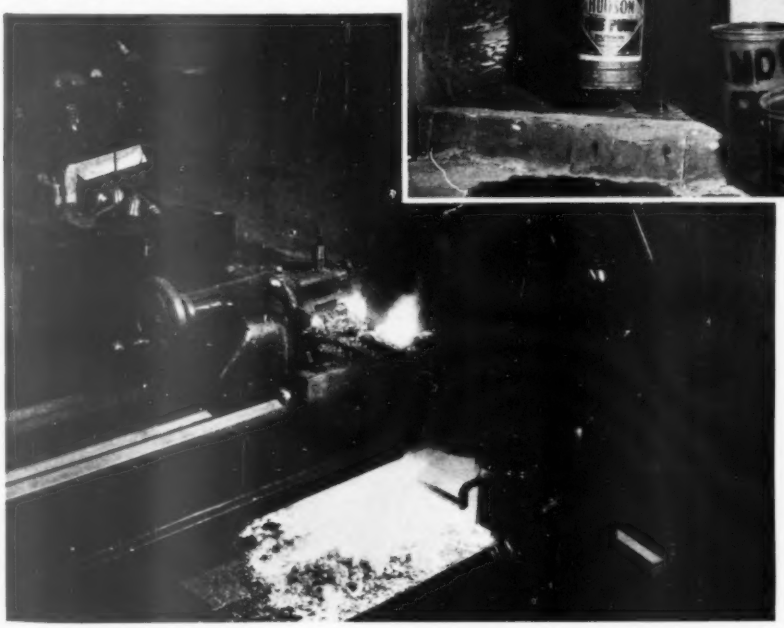
"If an aircraft carrier got as far as the lee side of the Coronado Islands, or the Santa Barbaras, for instance, it could easily release 40 planes," he says. "Each plane, carrying a 1,000-pound load, could handle 500 such incendiary bombs. This would mean a total of 20,000 bombs filled with magnesium igniting practically everything in, around and above and beneath an aircraft factory.

"The devastating effect of such a bomb load can only be guessed at. From an altitude of one mile, a plane would scatter its own particular load over an area

Fireman Michael Farris of Vega Aircraft Corporation developed formula using viscous liquids and carbon dioxide. Here he extinguishes blazing magnesium.

Douglas emergency stations are fitted with pump, sand, helmets and shovels.

Magnesium fire may deform or destroy machinery, such as lathe shown below.



of approximately 10,000 square yards, which gives you a pretty good idea of potential destruction we face if something isn't done about it."

Well, something has been done. There have been exhibitions at the leading aircraft factories showing workers how to extinguish the bombs both at the factories and in their own homes. And Fireman Michael Farris, of Vega, Fire Chiefs R. B. Gottschalk of Vega and John M. O'Connor, of Lockheed, seem to have the situation pretty well in hand. They aren't going to have 50,000 workers made idle and millions of dollars worth of equipment destroyed if they can help it.

The invention has swept over Southern California like the fire of incendiary bombs itself. Demonstrations of the efficiency of the method have impressed many of the leading fire marshals and chiefs of the state and municipal governments. Several minor fires in lathes and milling machines in the Vega machine shop have been extinguished by lathe operators without any pre-arranged instruction.

The extinguishing agent, which is entirely harmless to humans as well as to the most delicate machine—those machines mustn't be destroyed by the extinguisher any more than they should be by the fire bomb—is a combination of several viscous liquids and carbon dioxide. Upon contact with burning magnesium it reacts in such a manner that the fire is instantly put out. It is low in cost, is readily available and anyone can put the extinguisher in operation with ease.

Farris, to whom can well go credit for saving countless lives and millions in defense materials should an incendiary bomb raid materialize, became interested in perfecting an extinguishing agent in January, 1941, when the Dow Chemical Company sent an appeal to all laboratories asking for all information that might lead to a satisfactory method of controlling burning magnesium. This very important metal had become a problem child that could be worked to produce excellent results, but which was subject to ignition by friction and could not be readily extinguished no matter what method was employed.

All early attempts to extinguish magnesium fire were found to increase the burning rather than to extinguish it, and, in fact, violent explosions followed the application of water or other wet extinguishers. This characteristic not only resulted in the loss of much time and materials in machine shops, now so important in wartime, but it also added to the danger and difficulties involved in fighting incendiary bombs, which are nothing more than magnesium fires started by enemy bombers.

Farris, in referring to his invention, says:

"Most fires are extinguished by one or both of the effects of cooling or smothering. I set out to cool my magnesium fire below its burning temperature, using several chemicals and numerous gadgets. All attempts were unsuccessful.

(*Continued on page* 102)

AIRCRAFT OWNERS AND PILOTS ASSOCIATION

AOPA NEWS

The Aircraft Owners and Pilots Association, with Service Headquarters in the Michigan Square Building, Chicago, Ill., is a non-profit organization formed and composed of non-scheduled aircraft pilots and/or owners exclusively. The AOPA operates with a full-time professional staff and is the largest group of civilian pilots in the world. The views and statements of opinion contained in this column are those of the Aircraft Owners and Pilots Association and not necessarily those of FLYING. This column is edited by the staff of AOPA for its members and other interested parties. Special releases of a more confidential nature are additionally sent each month to all registered members.

AOPA in Uniform

IN this month's AOPA Section (a confidential, illustrated, monthly bulletin sent to all registered AOPA pilots) appears another long list of AOPA members now flying with the armed services.

It is natural that our interest in their flying and well-being should not stop merely because they have donned uniforms. The AOPA, starting with the Air Guard almost three years ago (which program was developed into the CAP), has taken an active interest in the transition of civil pilots into military pilots.

Therefore, when we speak of subjects relating to their flying, we are thinking of them as our registered members who, for the war period, are undertaking a new type of flying for serving their country and, in so doing, are participating in military rather than civil flying missions. And so we have part of the membership participating in military flying, part of it training future military pilots and still a third part participating in civil aeronautics exclusively.

Voicing Membership Opinions

Frequently we have quoted letters from members on various subjects of current interest. Recently many letters have been received from members in service as well as veteran pilots in civil life commenting upon many subjects closely allied to military flying and, in particular, regarding ways and means of reducing military accidents and increasing maintenance efficiency. The following is the gist of the trend of opinion:

Non-scheduled pilots of necessity know something about flying accidents. Veteran pilots particularly have a broad background of knowledge as to causes of mishaps and ways to avoid them.

Therefore, when many old-timers scattered far and wide over the country, being aware of natural hazards in all regions, make comments about air hazards, those comments are worthy of some consideration. The prevailing opinion of these veteran pilots is that military flight training could be carried forward with fewer accidents and without any decrease in the rate of progress in developing new manpower for the nation's air defense.

These analytical observers classified these accidents into two categories: Inexperienced pilots and faulty equipment.

Can They Be Prevented?

"Military secrecy" locks up the information on most of these tragedies. We must assume that this secrecy is necessary in the interest of the overall war effort. All realize that in time of national crisis training must be expedited. To this all will agree. On certain matters of technique, however, there has been considerable comment. Many veteran pilots, for instance, are not agreed that men with 250 or 300 hours need be dispatched on training missions in our big bombers when airliners are grounded because of weather. News accounts, if correct, have recorded several accidents due to that type of circumstance. Every life lost in that kind of training disaster is a life needlessly sacrificed, old-timers insist.

Haste Makes Waste

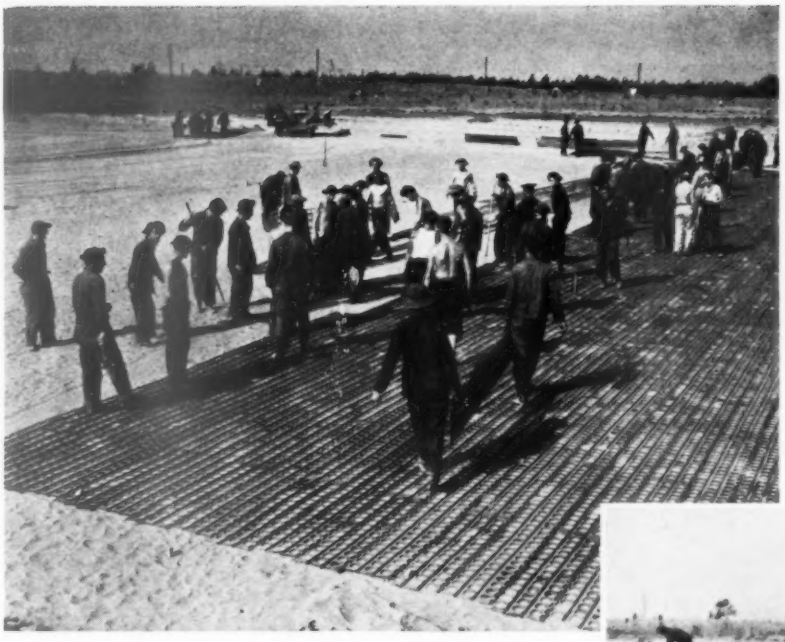
Landing accidents by the score have also been targets of the critics. Airmen know that enough practice under an instructor will develop a new pilot's efficiency in "bringing her down" safely. The old rule on teaching boys to swim was to "toss them in and make them get out alone." But the instructor always insisted on grabbing the youngster out of the water if need be. Swimming and flying are different activities, argue the vet-

(*Continued on page* 84)

The adventures of "Smilin' Jack," the famous cartoon aviator character, are in great part true to life. Here Zack Mosley, "Smilin' Jack's" creator, notes activities of fellow AOPA flight mates.

Steel Airport

by
GEORGE R. REISS



Transported by truck, sections can be quickly fitted together to provide a landing strip 3,000 feet long and 150 feet wide.

Portable steel runways, developed as a military necessity, may prove of great aid to post-war civilian air expansion.

Ingenuity of an American engineer solved the problem of how sections could be strongly linked but detached very easily.

WHEN the war is over, you—meaning the fellows who fly for fun, the commercial pilot, the airliner pilot or the military flyer—may be landing your airplanes regularly on broad, solid, wide steel airports, ports which can be picked up and transferred quickly if necessary.

And that—the portable steel airport—will have been another important contribution made to civil aviation by the war, the grim destroyer; and it probably will play a very important role in the further development of aviation that is sure to come in the post-war period.

Already, the nation's giant steel mills are busy rolling out these unique steel airports, many of which will be useless for the military services after the war; and that may mean they will have the same effect in promoting civil aviation after World War II that the *Jenny* had in promoting civil aviation after World War I.

For this steel airport makes it possible to quickly put down a first class hard-surfaced runway, suitable and safe for anything that flies, almost anywhere that an important need develops for a flying field, be it on swampy or rocky country or smooth level plain—and in a matter of days.

It takes months—and much money—to build concrete or surfaced runways and, once down, they must stay put, even if some change makes them worthless in their location. Not so with the portable steel airport. It can be put anywhere, and once its job is done, it can be moved swiftly and inexpensively.

The portable airport is not exactly a new idea—but is a successful one—and to Gerald G. Greulich, Pittsburgh steel specialty engineer, goes the credit for making it successful. The French, Germans and others have experimented with them for some years but they had many faults. For one thing, no way could be found to fasten them together so that they would not come apart under impact of a plane's wheels.

So some months ago, the Army summoned representatives of America's leading steel concerns and announced to the assemblage:

"Gentlemen, we want you to build us a good portable airport. It must be strong, light, simple, foolproof, safe and inexpensive. It must be so simple that it can be laid on any fairly level piece of land with a few days work; it must be so foolproof that if some parts are lost, it will still be useful; it must be safe for any type airplane under any weather conditions; it must be so light that it can be transported swiftly and easily to any spot; it must be. . . ."

And while the officer continued at length to outline the requirements for this unique airport, some steel men made copious notes which revealed they were thinking seriously about it; some made meaningless hieroglyphs on paper which revealed they had no ideas. But Greulich, specialty sales representative of the Carnegie-Illinois Steel Corporation, made a hasty pencil sketch on the back of an old envelope.

"Now," concluded the officer, "I suppose you gentlemen will want a little time to have your engineering departments get to work on the idea."

"No need for that," spoke up Greulich. "Here is your portable airport already."

The engineer, who had had no previous interest in or fundamental knowledge about aviation, displayed his hastily scribbled sketch—and there was the answer the men had sought, the main principle of the landing strip which recently was described by Lieut. Gen. Henry H. Arnold as "the year's greatest contribution and achievement in aviation." Greu-

The portable runway is designed to be rushed forward behind a rolling attack. In this way the flight distances to military objectives can be materially shortened.

lich had, in those few minutes, discovered a way of binding the airport together.

Of course, Greulich's job was not completed with that sketch. The engineer, who has patented about 80 devices made of steel, envisioned one broad, firm, long platform of steel pieces, each solidly bound to the other so they can be separated easily—but *not* accidentally.

He took his idea back home, had some steel "planks" made up to his specifications and then spent weeks in testing and improving his device in his own backyard. He immediately found one glaring flaw in his idea. The planks were too heavy, weighing 18 pounds per sq. ft. He found that, by punching big holes into the planks, he could reduce the weight to five pounds per sq. ft. without reducing strength or efficiency, and at the same time improve traction and drainage.

But his hastily-penciled sketch had solved the main problem, that of joining them together solidly, although still easily detachable.

Greulich's idea is merely hundreds of these steel planks, each 10 feet long, 15 inches wide, a quarter inch thick and weighing 65 pounds, joined with sliding interlocking projections on one panel which fit into slots on the next. Simple little pins lock these into place, to keep the planks from coming apart under the pounding wheels of heavy airplanes.

Fitted together, they form a single firm runway from 100 to 300 feet wide and 3,000 to 4,000 feet long, with the bearing weight of four inches of concrete (but without the danger of damage by frost that exists in concrete runways).

Besides, it is so simple that should some of the planks be damaged by enemy bombs (or by accident) workers could, with only a few minutes work, knock out a few pins, replace damaged sections with new ones and lock them in place, making the runway as good as new—and at the cost of a few dollars.

And when the need arises to move it, workers knock out the pins, pick up the planks and load them into trucks, and away they go to make a new runway elsewhere.

Greulich built such a runway at Langley Field, Va., where it was given exhaustive tests. Heavily-loaded trucks and tractors pounded back and forth across it, trying to break it down. But it stood the most severe beating.

Recently one was put down near Hoffman, N. C., during Army maneuvers, and some real speed in airport building was displayed. The Second Battalion, 21st Engineers, who put down the strip, needed only 11 days to prepare and grade the ground and lay the sheets. One crew of 75 soldiers achieved a speed of one foot per minute, putting four of the 15-inch wide strips across the 150-foot wide mat in five minutes.

"But," apologized the engineers, "we're a little slow yet. Wait until we get a little experience and we will grade the land and lay the landing mat in less than a week."

At Hoffman, the 126th Observation Squadron of the First Air Support Command tested the mat with North American O-47A observation planes day and night and under all weather conditions, in cross winds, on nights when visibility was poor, and in wet weather, in the worst conditions they could find that might parallel war conditions.

They found the landing mat ideal. They found that rain does not make it slippery or interfere with traction; that braking action after landing is easier than on a concrete or black-top runway, and that there is less wear and tear on the planes' rubber tires than on other hard-surfaced runways.

Almost every type of plane in the Air Forces from the 65 h.p. "puddle jumpers" to the huge 20-ton B-24s whose four engines turn up nearly 5,000 h.p.—landed and took off on the steel runway. The Bell P-39 and Republic P-43 fighters found the strip just as safe and smooth as did the lumbering bombers.

It showed no signs of breaking down under them. One of its excellent advantages for war purposes is that it lends itself well to camouflage and can be made invisible from the air. It may be made to look like a cornfield; or camouflaged as a village by painting a road through it and, by the use of shadows, simulating buildings. The use of shadows is of particular importance in minimizing the value of aerial photography. The runway used in the North Carolina maneuvers was painted to appear like an orchard.

During the maneuvers, a veteran RAF pilot flew down from Washington to observe the war games and sought to land on the camouflaged runway. He circled the area, almost over the spot. Finally, he contacted ground radio stations, demanding to know its location.

"Why, you're almost over it," one operator told him.

"Well, I can't see it," he replied.

Finally, his gasoline exhausted in the futile search, he made a crash landing 10 miles away.

The portable runways are extremely popular with many pilots. One of the problems the busy engineers encountered was an extremely large number of "forced landings."

"You fellows," protested one of the engineers when he became exasperated with the delays in the work, "will have to stay off this airport while we're doing our work."

"We can't help it if we have forced landings, can we," replied one pilot. "In case of a forced landing, we pick the safest possible field."

"Well, we can help it," retorted the engineer. "We'll put obstructions on it until we are done."

They did—and that ended the epidemic of "forced landings."

These steel runways eliminate the moving of thousands of tons of heavy slag used as a base for runways, then more thousands of tons of cement and sand or blacktop material for surfacing. All that must be moved is the steel—about 1,000 tons of it for a 3,000-foot long and 150-foot wide runway—only a fraction of the weight of a standard concrete or blacktop runway.

Greulich's portable runways are slightly more expensive per square yard than ordinary concrete or blacktop runways. But that may be due to the war, and peacetime readjustments would probably bring down their cost.

The portable runway has tremendous peacetime aviation possibilities and perhaps may even provide an important new market for excess steel production capacity and huge plate mills created to roll plates for tanks, ships and other war purposes but with little other peacetime use.

America's steel men may be the important airport builders of the future.

END

Canadian women have taken their places with the men in the RCAF. The Women's Auxiliary proves a valuable adjunct by relieving men for fighting.

by KURT RAND

Members receive two-thirds the pay of the comparative rank in RCAF and wear similar uniforms.

The Ladies Go To War

Auxiliary airwomen must maintain their uniforms in trim condition.

WITH the first classes of the Canadian Women's Auxiliary Air Force trained, young women are now taking their place with men in a number of jobs in the Royal Canadian Air Force. Airwomen in a uniform similar to that of the air force are now seen on the streets of Canada's larger cities and at air training bases throughout the dominion.

Announced last summer, training of the auxiliary air force did not start till late in October. First classes were trained for administrative work, with officers being appointed from these classes. Any airwoman has a chance to reach officer rank in the CWAAF, qualifications depending entirely on merit and ability to lead. Like the sister service in England, which sent officers to train the Canadian organization, the CWAAF will replace men as much as possible in administrative and clerical work, cooking, transport driving, as equipment assistants, fabric workers, hospital assistants, telephone operators and in general duties. Later, like their sisters in Great Britain, they will learn to be wireless operators, dental orderlies, instrument mechanics, spark plug testers, parachute packers, flight mechanics, armorers, electricians, balloon operators—in fact to fill nearly every ground job now done by men in the air force.

So many young Canadian women want to get into active service that travelling selection boards have been in operation throughout Canada for some time, interviewing those who have applied for enlistment, sending as representative a number of Canada's young womanhood

(*Continued on page* 112)

Potential pilots with correctible defects find these veteran flyers of World War I ready to aid them.

Pilot Savers

by E. JAY DOHERTY

Members of Aviators' Post 743, American Legion, have created a vital role for themselves in our war effort by reclaiming Air Forces' "rejects."

YOU'VE heard of Aviators' Post 743 of the American Legion. Its membership consists of pilots of World War I who flew for their country. Some of them never flew farther than their training fields; some flew in France; some are aces; some never saw a German. But they all belong to that fraternity of U. S. World War pilots, and they all feel deeply their obligation during this war.

Most of them would like to fly again for their country. But they are too old, although they refer to themselves still as "the boys." It was a bitter pill to swallow, this realization that they no longer are fit for combat duty, but swallow it they did, and with a grin. Surely their military service was good for something. Maybe it wouldn't qualify them to pilot today's hot pursuit planes or suit them for the rigorous life of a war of motion, but someplace, somehow, they ought to fit into the crisis. They appointed a committee to find how and where they might do the most good.

From the committee's recommendations has grown the American Flying Services Foundation, known from New York to California as AFSF. Its purpose? To enable potential pilots with correctible physical and educational defects to overcome their handicaps and become aviation cadets. To provide doctors and money for medical and dental cases. To provide money for schooling. To give advice to interested young men. To befriend members of America's flying services.

The idea is sound. Of every 10 applicants for Army and Navy aviation cadet ratings, eight are rejected before their enlistments. Of these eight found unsuited for military flying, four can be made acceptable with the proper medical care or additional tutoring. Although the Foundation does not neglect the hopeless cases altogether, it is principally interested in the young men who can be made to qualify.

The AFSF is still too young to be judged profoundly, but it has made an encouraging start. Founded March 7, 1941, the organization established its headquarters at 60 East 42nd St., New York, the following May. It has given advice to more than 6,000 men and has

Tom Brennan, rejected by Navy, is given an AFSF operation to clear nasal obstruction.

definitely helped some 2,500 with schooling and just plain enlightenment. But the biggest accomplishment is the rehabilitation of 560 rejected applicants through medical assistance. The numbers are pyramiding week by week, as mail inquiries roll in from many states, as publicity makes the Foundation known and as enlistment centers learn to send rejectees for help.

Who pays for it? There are thousands of people all over the United States chipping in what they can afford. Their gifts have ranged from $1 to $1,000. The doctors who do the work help pay for it in reduced rates and donations of time. American Legion posts and service organizations are giving donations to the AFSF to "Start 'em Flying." Like the Red Cross and the Boy Scouts it owes its existence to the loyalty and support of the public.

Money is raised through the sale of Foundation associate memberships at the rate of $1 a year. This entitles the contributor to wear the insignia of AFSF. Donor members are those who contribute not less than $100 a year, and anybody (exclusive of the World War flyers who founded it) who contributes $1,000 or more can be a founder member. Pilots —civil or military—can join by contributing $3 a year.

Because its early experience led the officers of the Foundation to believe the average cost of medical and dental rehabilitation would be $50 per applicant, it conducted a highly successful campaign to have American Legion posts "adopt" applicants by donating that amount to the treasury for each adoption. The campaign is still going strong and catching on with other clubs, but the average rehabilitation cost has risen to $100. This makes the operation of the AFSF an expensive proposition. Yet the applications for assistance roll in faster every day.

They can't roll in too fast for the people active in AFSF. When the disbursements begin to exceed the income, they'll find a way to get more money. They are convinced of the importance of their work —which is voluntary, by the way—and go about it in so unostentatious a manner that one is impressed with their confidence.

The military flying services endorse the AFSF. Maj. Gen. H. H. Arnold said in his speech accepting the Gen. William E. Mitchell Trophy for 1940, "May I now commend the activities of the Aviators' Post in the assistance which, through the American Flying Services Foundation, they so unselfishly give to those aspiring to become flying cadets in the Army and Navy. This complements and supplements the work of the recruiting services and should assist in augmenting our flow of pilot material. We are endeavoring to maintain the same high standards which prevailed in the World War I and with the help of people in various com-

Two months later, Brennan (left in trio) passed physical, became Naval air cadet.

The Army Air Forces rejected this lad because of eye defect. Exercises were prescribed and soon cured his trouble.

Picking up a ball with the toes is one of the exercises recommended for flat feet, a common cause for rejection by Air Forces.

munities such as this, we shall succeed."

As a matter of fact, the service medical examiners at 90 Church Street, Whitehall Annex and Mitchel Field, in New York, send rejected applicants direct to the medical headquarters of the Foundation with reports of the reasons for rejection. These men usually go there directly after flunking their physical examinations. They arrive dejected as well as rejected. Miss Gladys Ward, one of the three paid clerical employees, greets them and refers them to specialists on the medical council.

The specialists diagnose the applicants' cases and make their recommendations as to action the Foundation should sponsor. Often the applicants are fit for their re-examinations within two to six weeks and pass on to a training center as aviation cadets. Whatever steps that must be taken are handled by the Foundation. If the young men can pay all or part of the expense of rehabilitation, they do so. If they cannot, the AFSF bears all costs.

Eye, nose and teeth disorders take the greatest toll of applicants. Hernias, high blood pressure, low blood pressure and speech disorders are common stumbling blocks. No matter what the trouble is, AFSF will undertake to correct it, provided only that the specialist believes it curable. Some 600 men have been treated by the medical corps since it began operations last July.

One man was disqualified by the Navy for a cyst at the base of his spine. A Foundation surgeon operated. He was in the hospital two weeks at AFSF expense, then was re-examined and accepted by the Navy. By far the greatest number of rejections are the result of imperfect eyesight or muscular action of the eyes. "Poor depth perception," "poor convergence," "defective vision" or "poor divergence" turn up on one report after another. Military flying, you gather, requires perfect eyesight.

Foundation medicos have corrected hammer (bent or overlapping) toes, removed tonsils and appendices, cured catarrh and intense nervousness, filled teeth and corrected bite. Their work is done in 25 states and in double that many cities. Without them the Foundation would be only an ideal. Dr. S. M. Strong, a World War pilot, is the director of medical headquarters. On the medical committee with Dr. Strong are Dr. Thomas Garrett, a psychiatrist, and David Q. Hammond, superintendent of New York's Fifth Avenue Hospital. Hammond's son is an aviation cadet. The medical council is composed of 13 prominent specialists, all of whom served in the World War I.

The American Flying Services Foundation comes nearer to being "one great big happy family" than many organizations claiming that distinction. Everybody active in its work makes a point of becoming acquainted with the men currently receiving help. Even when the Foundation's work is technically through and the men are first soloing or wearing their wings, the Foundation's "boys" keep in touch with their benefactors. They fill letters with their hopes and fears and enthusiasm, taking it for granted that AFSF's personnel are still vitally interested in them. These letters are answered individually by H. Llewelyn Roberts, the chairman, whose business is left to run itself while he spends his time with AFSF. Or they are answered by Lois Pemberton, one of the full-time employees, who is typist, morale-builder, promoter for the AFSF and "beautiful sister" to the boys.

Legion Posts subscribing to the "Adopt a Pilot" plan are introduced to their charges and usually assume a possessive attitude, following with intense interest their careers. The Legion uses a multitude of plans for raising the money to pay for their adoptions. They hold "Start 'em Flying" nights, block parties, aviation balls, Legion movies, "Pennies for Pilots" boxes, appeals by the clergy, proclamations by their home-town mayors and other ingenious money-raising schemes. Their aim is to get every post in New York State to adopt at least one pilot. Many have provided the funds for rehabilitation of several.

You might wonder whether boys suitable to become officers of the U. S. Army

(*Continued on page 112*)

AIR SERVICES Section

Enlisted men learning engine and plane maintenance at Douglas Aircraft factory. Note lecturer at microphone.

TRAIN MAINTENANCE CREWS

THE Army Air Forces and major aircraft manufacturers have embarked on a co-operative program to train enlisted ground men and mechanics in the maintenance methods demanded for today's high-speed military airplanes. For every plane delivered to the Army, efforts will be made to provide a crew of mechanics specially trained to keep it flying.

Groups of maintenance personnel with only basic training are being sent from Army air bases to selected airplane and engine plants for intensive schooling by manufacturers' experts in actual service problems and techniques.

A typical demonstration of how the program is working is seen in its operation at the several California plants of the Douglas Aircraft Company, where a four-week training course was initiated for more than 1,000 enlisted men.

With company engineers and technicians serving as their instructors, the Army men see and hear how Douglas planes are built, the engineering and shop procedures employed, the various equipment installed and how to inspect and service the planes. Each day the student mechanics attend classroom lectures, watch demonstrations with actual parts and assemblies and later do practice service work on Douglas aircraft just off the line. In the evening, the program calls for homework study of maintenance handbooks.

Supplementing available classroom space at one of the Douglas plants, the company erected a huge circus tent. Bleachers under the "big top" are the classroom seats, while in the "main ring" a raised platform and public address system aid in lectures and demonstrations.

Chartered buses bring the men to the Douglas plants each morning from various clubs and hotels where they are quartered. Every feature of the type of plane concerned is thoroughly discussed and analyzed in special courses prepared by educational directors and experts of the engineering and fabricating divisions.

While this is the largest mass educational program yet arranged, service schools were pioneered by Douglas as far back as 1937. Under the program then inaugurated, schools of instruction for many different models of military aircraft have been conducted. To them have come officers and men of the U. S. Army Air Forces, Naval air service and Marine Corps, in addition to the British, Norwegian, Dutch, Peruvian and Iraqui air forces. The service school course is climaxed by written examinations, with results sent to the trainees' home fields.

Seek Accident Data

THE War Department is anxious to receive accounts of narrow escapes experienced by flying officers, it was announced recently in Washington.

Stating that the expansion of the Air Forces had made it necessary to utilize a large percentage of experienced pilots in command and staff duties where they could not easily transmit their experience to younger pilots, the announcement urged pilots to submit, in narrative form, an account of their narrowest escape.

These reports are to be published in order that other pilots, particularly recent graduates, may profit by the experiences of others. It is further requested that pilots submit, over their signatures, recommendations that might tend to eliminate or reduce the accident toll.

Reports and recommendations may be submitted by the officer direct, and should be addressed to the Commanding General, Army Air Forces, Washington, D. C., marked for the attention of the Safety Section.

Study Axis Plane Types

PART of the course of study for aviation cadets are descriptions and performance figures of more than 50 types of combat aircraft now in use by Germany, Italy and Japan.

Simulating actual airport operations, apprentices use model planes and radiophones.

ARMY TEACHES AIRPORT CONTROL

ONE of the latest developments in the Army Air Forces' diversified special schools is a three-week practical training course in airport traffic control operation and the three main functions of the Army airways communication system. The course is given at Maxwell Field, Ala., headquarters of the Southeast Army Air Forces Training Center.

Simulated air traffic is composed of model bombers and the airport is the floor of a classroom unique in its adaptation for instructing student control tower operators. The room itself has been made over into a complete model airport with hangars, obstructions and runways. It is complete even to two-way radio communication between instructor and student operators who take turn "flying" the model planes around the room, complying with orders issued by students in the "control tower."

Located in an upper floor of one of the Post buildings, sufficient area is provided to permit from six to 12 apprentice tower operators to go through all the motions of actually directing air traffic.

The heavy increase in military air traffic has made imperative the training of personnel to handle safely the arrival and departure of all types of aircraft from light liaison planes to *Flying Fortresses*. The system taught at Maxwell Field is patterned after that developed by the Civil Aeronautics Administration for the control of scheduled air traffic on the nation's airlines. All students are graduates of the Air Forces' communications schools and many have had actual radio or traffic control experience in civilian life.

The chief point gained by the use of models and the simulated flying field is that the student tower operators are (theoretically) put in the cockpit and become familiar with the limits of planes and pilots in complying with orders they themselves might issue in actual control duty.

Training in Camouflage

SPECIAL courses of instruction in military camouflage for officers of the Army Air Forces were scheduled to be initiated July 1 at the Engineer School, Ft. Belvoir, Va. The first class consisted of 50 officers of the AAF and 20 ground force officers. The course consists of two weeks' intensive training in camouflage, including concealment of airports, dispersal and concealment of aircraft on the ground and maintenance of camouflage discipline.

Physical Defects Ruling

ANY reserve officer disqualified for active duty with the Army because of a physical defect which is correctible, who fails to correct the defect within a reasonable period of time or states that he does not intend to correct it, will be discharged from the service, the War Department has announced.

This policy does not apply to reserve officers who are disqualified because of a physical defect which is not correctible, it is pointed out. Such officers may be separated from the service only by resignation.

Air Medal Established

PRESIDENT ROOSEVELT, by executive order, has established a new award to be called the Air Medal for members of the Army, Navy, Marine Corps and Coast Guard who have distinguished themselves "by meritorious achievement while participating in aerial flight."

Room Service

A BILLETING office has been established by the War Department to find hotel accommodations and living quarters in Washington for officers ordered to duty in the nation's capital. Hotel reservations or other temporary arrangements may be arranged for officers upon 24 hours' advance notification.

Pictures Tell Story

THE Army Air Forces are going to the movies on a grand scale. The old saying that one picture is worth 10,000 words and what you once see you can't "unsee" is the basis of the modern trend toward the use of pictures, charts, maps and diagrams as effective teaching aids.

Art Goebel in Service

Major Goebel

NOW that Maj. Art Goebel has reported for duty at Midland, Tex., Army Flying School, the world's largest bombardier college, hopes are soaring high in the budding "Hell from Heaven" men who are being groomed for Uncle Sam's all-out aerial offensive against the Axis.

Major Goebel probably knows as much about flying the Pacific as any man in the world and is *especially* familiar with the air around Japan—and Japan is where the bombardiers expect to get in some telling blows in the not-too-distant future.

"Why, I'll bet he even knows where 'Shangri-La' is," one of the bombardier cadets said. If the former speed flyer does know the location of the mythical base from which his old friend Brig. Gen. James H. "Jimmy" Doolittle led the first raids on Tokyo, he isn't telling. But he is ready and willing to impart all of the information at his command to the youngsters who now are mastering the bombsight in anticipation of combat operations over the far reaches of the Pacific.

Winner of the DFC and holder of many cross-country and transoceanic flight records, Major Goebel first hit the headlines in 1927, when he won the famous Dole Derby from San Francisco to Honolulu. He later made an aerial tour of Japan. The bombardier boys are glad to have him and their unanimous opinion seems to be "gosh, what a 'chauffeur' that fellow would make from Shangri-La to Tokyo!"

Solo time in planes like this Ranger-powered Fairchild should not be squandered.

How to Fly 60 Minutes an Hour

by JOHN R. HOYT

Do you get the full benefit from every minute of your solo flying? If not, you can learn a lesson or two from this writer's practical suggestions.

PILOT NOTSOHOT was practicing for a re-examination on his flight test. His lightplane bored upward for altitude with the airspeed oscillating erratically between 50 and 60 m.p.h. As the pilot lazily relaxed, idly watching the landscape, his ball-bank indicator slid over to one side and the plane didn't know whether it was slipping or skidding. Climbing at 300 feet a minute it was some time before enough altitude was attained for spins; was Pilot N getting 60 minutes' worth of flying per hour?

Not much! He was getting about 40 minutes of flying plus 20 minutes of plane-herding. As a matter of fact, those 20 minutes were forming habits—every one of them bad habits. Pilot N was becoming a plane-herder, letting the plane fly him, skidding in his climb and relaxing that constant vigilance which distinguishes a pilot from a dope.

Unless his pockets were full of folding money there was no good reason for wasting such valuable time. Every flight should be planned—from the moment the prop is twisted to the time the switch is cut. This applies particularly to anyone who is having trouble with flight tests, and who is coming up for re-examination.

In the first place, anyone having trouble with his flying gives proof that somewhere during training he wasn't paying attention to one or more phases of his work. In brief, he had never gotten 60 minutes of flying out of his hour; he had probably taken off, drifted away from the airport, lazily and inattentively gone through a few of the required maneuvers and then finished his time with a bit of sight-seeing, flat-hatting and a sloppy return to the field.

For example, Pilot N cranks up the plane and taxies out. Does he make his taxiing smooth, using plenty of rudder and very little brake? Does he turn the plane on both wheels, rather than a sharp, rubber-scrunching pivot? Does he carefully check *everything* before take-off? Not he. With a vague idea of practicing steep turns, he blasts the tail around, taxis straight out on the field and bounces off the runway.

All the way up to altitude he will . . . well, let's begin all over. Let's consider what he should have done and forget about the incorrect way. Let's see if a method of getting 60 minutes of flying from each hour can't be laid out. It will save money, time, effort—and what is more, help you to pass that flight test the first time and with a better grade than might have otherwise been attained.

The very first thing to do is to determine one's saturation point. After how long a time do you cease to learn? Some people tire easily, others not at all. If you find that at the end of 25 minutes of intense concentration your brain does not retain knowledge, that you are confused or hazy, go back to the field! If your limit is 45 minutes, don't try to practice longer than that amount of time. Finally, if your limit is two hours, don't go out for more than an hour; you'll find you learn more easily by several flights of short duration than by cramming the same time into a single hop.

The next thing is to determine the type of flying to be done. There are, in general, three types: primary maneuvers consisting of the usual turns, pylons and precision work; advanced or acrobatic maneuvers; cross-country, including instrument flying. Each one should be well planned beforehand in order to assimilate all of the value possible from the practice.

Suppose then that a primary student is setting out to practice for his flight test, consisting of spins, steep turns, stalls, pylons, emergencies and spots. From the very minute he starts to taxi out, that practice period begins. From that time on, no performance is acceptable but the very best! The first rule of taking a flight test is to relax—to do one's average, daily best and no better. Therefore every single maneuver must be made just as if the inspector were sitting there in

(*Continued on page* 106)

Naval aviators will be trained inland on this Great Lakes boat, now being converted into aircraft carrier.

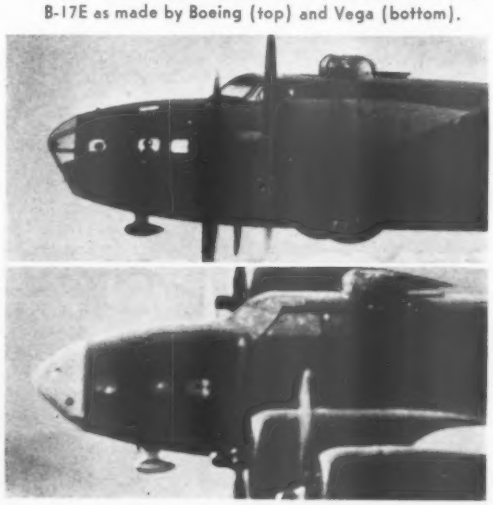
HAVE YOU SEEN ?

Aircraft workers are granted priorities on purchase of bicycles. Here is typical lineup at one of the Douglas factories.

With gear, prop, instruments and turret wrecked, this RAF "Wellington" flew home.

There is a marked difference in the nose of the B-17E as made by Boeing (top) and Vega (bottom).

The Aeronca "Defender," its engine removed, new landing gear and fin installed and cabin extended, now is in production as a two-place glider for the Air Forces.

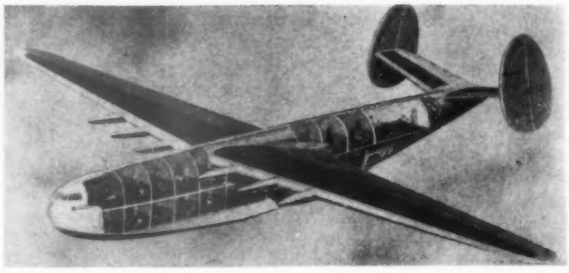


Collapsible rubber raft and equipment now carried by all Army bombers patrolling over water sustains crew of five.

Tightly wrapped to protect it from corrosive salt spray, a Lockheed P-38 "Lightning" interceptor arrives at a port in Australia as part of the "deck cargo" of an Army transport.

Upturned wing tips distinguish the Curtiss S03C-1 "Seagull." This Navy scout-observer can be flown with wheels or floats.

Six engines are provided in Glenn L. Martin's plan for a post-war plane to carry 13 tons of freight, crew and 102 passengers.



Air Forces pilots learn operation of multi-engined craft on these Curtiss AT-9 twin-engined transitional trainers. Performance and even location of plant is restricted data.

The actual operation of carrier arresting gear at the moment of contact of hook with cable is revealed in great detail as a Grumman "Martlet" lands on flight deck of HMS "Illustrious."

I LEARNED ABOUT FLYING FROM THAT!—NO. 38

by Lieut. JAMES W. ROBB, USN

Blind spots—his plane's and his own—combined to bring a lot of grief to this take-a-chance pilot.

"WHEN in doubt, give it the gun and go around again."

This old flying axiom had been drummed into me thoroughly and I, in turn, had passed it along to succeeding novitiates. It seems, however, that there comes a time in every pilot's life when he "dopes off." And my little mis-adventure not only re-emphasized the wisdom of "gunning and going around again," but of doing all my "doping off" in my bunk.

The author (in cockpit) tells fellow pilots how he "learned about flying."

After completing the pilot's course at Pensacola, plus three years of flying with a scouting squadron, I had amassed 1,300 hours and the ebullient conviction I could handle any old plane any old time.

Then I was transferred to a Utility Squadron, using Sikorsky (JRS) and Grumman (J2F) amphibians. I didn't notice much difference between this latter single-engined type and the scouting planes I'd previously flown except that there was more "blind" ahead and below. This, of course, is due to the projecting hull type main float. If only I'd remembered this "little" point.

I took off about seven in the morning for a routine flight of some 70 miles to an outlying field, which was then in the process of construction. When I arrived I found that a 25-knot wind was blowing across the one runway which was partially completed. By that I mean a landing strip about 200 feet wide and about 1,500 feet long had already been surfaced. Being familiar with the ground looping tendencies of the Grumman in a strong crosswind I'll admit I thought seriously of just passing the whole thing up and heading for home. But there my alter ego — call it what you may—came into being. Wasn't I a pilot? Didn't I have 1,300 hours? I guess it was just a stubborn streak. After all, I had flown out for a specific reason and I was going to land, regardless.

Came more small talk between Better Flying Sense and Old Devil-Take-A-Chance:

"Why don't you 'drag' it first?" said my B.F.S.

"Who, me? Why waste time? That landing strip looks plenty good," swiftly rejoined O.D.T.A.C.

So—I circled the field once and started up the groove. I could feel the wind drifting me sidewise, but I figured a gentle slip would handle that. By the time I reached the runway it looked a good deal smaller than it did originally. Also, the wind had drifted me more than I'd figured, for instead of landing on the runway I'd drifted over to the strip bordering it and was about to set down on an assorted jumble of stakes, loose gravel and miscellaneous refuse. A quick glance to the right revealed an area apparently clear and with plenty of room. And then I succumbed to temptation. I knew just as surely as I know my name that at that point I should have given it the gun and gone around again for another approach. Instead I kicked it once to the right and set it down in what was supposedly the clear area. The plane nestled comfortably, rolled along for about 60 feet and then—wham!—trouble!

A violent jar—a terrific vibration shuddered throughout the plane immediately followed by a loud tearing noise. The plane abruptly started a ground loop to the left and the brakes were powerless to check it. The left wheel rolled merrily past, the left wing tip float was plowing deep furrows in the ground, and around we went like the wheel of fortune, finally coming to rest 180° from our original heading—still upright but well-shaken.

I sat there for a few minutes improving on Webster, exhausting a few vocabularies of my own, and inwardly cussin' myself for being the stupidest, dumbest pilot in the world. But what in hell had happened?

Well, I'd run into a "drag" left lying around on the edges of this newly-constructed field by a WPA workman. It had lain exactly beneath my blind spot but if I'd gunned and gone around again I would have seen it without fail.

Then came more trouble, alas, pouring in a literal shower of wails and woes. It started to rain with all the quiet fervor and unlimited volume of a "California Orange Juice Festival." Soon the field was knee-deep in mud. No repair facilities were available and the weather was so bad that no repair plane could be flown to me for three days. Luckily a Marine detachment was stationed on the field, so I at least had the benefit of shelter in their cantonment against the elements, if not against my injured pride.

But troubles never come single file. I'd just been paid before leaving the base and, after finishing up the few bills I owed (us single guys can brag, huh?) there still remained about 122 shekels. These shiny iron men had been carefully stowed into my uniform pocket, and the jacket neatly hung on its usual hook—*back at the base.* When I arrived there four days later the money. . . . (need I finish?) was gone. Have you ever been airsick? You should have seen me!

I'm a changed man now. Not embittered. No, not soured, nor given to making faces at little children. But just a man who has learned his lesson. I never enter a strange field without dragging it carefully once and even a second time. Also, I never leave money lying carelessly around any more.

END

Dotted line leading from cockpit of Grumman J2F-1 illustrates plane's "blind spot" created by projecting hull. Ignoring this factor led to pilot's mishap.

Seaplane Tea Bags

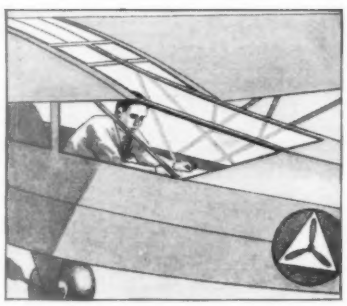
CORROSION is prevented in Navy seaplanes by using potassium dichromate in fuel tanks, hulls and floats. Occasionally, tea bags served as containers for the chemical.

Shake Hunters

INSTRUMENTS which record all vibrations and separate the components for study have been purchased by Aviation Manufacturing Corporation's Lycoming Division in its quest for smoother engine operation for Lycoming 50 to 75 h.p. lightplane motors.

The New PIPER PATROL Is Ready!

Reporting for Active Duty with
THE CIVIL AIR PATROL



The transparent cabin enclosure provides unparalleled visibility for Civil Air Patrol flying.

FREE CATALOG showing all the Piper planes may be obtained from your Piper Dealer. Or, if you wish, we will gladly mail you one of these handsome, deluxe catalogs which portrays all the new Piper ships in full natural color, providing you enclose 10c in stamps or coin for postage-handling. Piper Aircraft Corporation, Department PA82, Lock Haven, Pennsylvania, U. S. A.

Here is the ideal plane for use in Civil Air Patrol . . . recommended by pilots, built by Piper and especially suited for patrol flying! The new Piper Patrol is an adaptation of the Piper L-4A, built for the U. S. Army. It has visibility all around the compass and a reversible seating arrangement for the observer with a desk shelf upon which observation reports can be written while in flight. Like all Piper planes, it can be flown by any pilot, and with traditional Piper economy of operation. Dual controls permit the Patrol to be used as a trainer when not on CAP duty, thus doubling its utility to the flying service operator. Available in standard Piper colors with CAP insignia on fuselage and wings. See it and fly it at your Piper Dealer's.

PIPER
POINTS THE WAY TO WINGS FOR ALL AMERICA

The Billy Mitchell Case

(Continued from page 20)

cers appeared later to protest that his conduct of this command was not entirely without flaw, his success was brilliant and was recognized as such by his own and the other allied governments.

For repeated acts of extraordinary heroism in action he received the Distinguished Service Cross, and for his superb staff work the Distinguished Service Medal. To these decorations from his own Government were added a half dozen honors from our Allies. The French awarded him the Croix de Guerre with five palms, and made him a Commander of the Legion of Honour; the British gave him the rank of Companion in the Order of St. Michael and St. George, and Italy conferred the orders of Commendatore S. S. Maurizio e Lazzaro, Medal for Merit in War, and Grand Officer of Italy.

With such a war record, Mitchell was the logical choice at the war's end for the assignment he received as Assistant Chief of the Air Service, retaining his wartime rank of brigadier general. His chief again was General Patrick, like Mitchell an able and enthusiastic airman, but not possessed of the same headlong impetuosity. Mitchell took charge of all training activities of the service, and did a notable job.

The Air Service was young, however, and Mitchell soon found that the other branches of the Army did not see eye-to-eye with him in his vision of future wars to be fought entirely in the air, with navies reduced to nothing but submarines hunting out merchant shipping and ground armies virtually relegated to the jobs of national police— he was to testify before a Congressional committee within a few years that future wars must be fought without human armies coming together, leaving prosecution of war to aerial bombing and combat.

The military mind is essentially conservative, and Mitchell grew more and more exasperated at the apathy and indifference of old line officers, which seemed to strangle air development in a mass of red tape and precedent. It was only natural, of course, that officers of other arms should be skeptical of the claims made for the air arm. Planes and pilots had played a romantic and spectacular part in the war with Germany, but hardly a decisive one.

Skeptical they were, and their deadening influence on the lusty infant among the arms led Mitchell and his fellow air officers to the rather logical conclusion that the only way the Air Service would be permitted to develop as it should was to establish it as a separate and independent branch of the national defense. It was a logical position for them at that time, although its merits were then and are now highly debatable, and Mitchell was on surer ground when he proposed a single Department of National Defense for unified command of land, sea and air.

Generally speaking, however, this latter proposal appears to have been to him merely a device to achieve the thing that lay closest to his heart—independence of the air arm from both the Army and the Navy. He came back from France with a contempt for navies almost beyond the power of words to express—although Mitchell somehow seemed to find the words. He could always find words. He had the gift of gab and a genius for invective second only to Gens. Smedley Butler of the Marines and Hugh S. Johnson of the Army. He used the gift in extravagant fashion. Exaggeration is of course a popular device for attracting attention to fact, but one that is apt to boomerang unless used carefully. Mitchell, sure of himself and his views, finally grew too angry to be careful.

"Test Pilot Filstrup calling! Nose wheel is retracting too far!"

He was hardly installed in Washington in 1920, before he touched off the controversy by informing a Senate committee that "battleships opposed by aircraft will become as obsolete as plumed knights after the invention of gunpowder." That was his theme and he played variations on it for the remainder of his career.

Mitchell voiced his low opinion of surface ships so often and so caustically that the Navy finally selected from its war prizes the German battleship *Ostfriedland* and the cruiser *Frankfurt* to give Mitchell and his Army airmen a chance to test their "extravagant claims." On July 18, 1921, Army bombers sank the *Frankfurt* 60 miles off the Virginia capes, and two days later they sank the *Ostfriedland*.

Mitchell exulted over the results, seeing a complete vindication of his belief that the battleship was useless. The Navy, charging that the Army pilots had violated instructions in such a way as to prevent adequate observation of the results, maintained that Mitchell had not proved a thing. As a matter of fact, he had proved at least that a battleship unprotected by planes or antiaircraft fire could be sunk by bombs from the air. That was something which had not figured previously in the textbooks of war, although it may not have been quite as much as Mitchell made it appear to be.

The final bitter struggle began in December, 1924, when Mitchell appeared before the Appropriations Committee of the House and testified that the United States was falling behind the rest of the world in aviation, and already was trailing Great Britain and Japan. There were 5,000 reserve flying officers on the books of the War Department, he said, but out of them the Army would be able to get not more than 450 qualified military pilots in case of war.

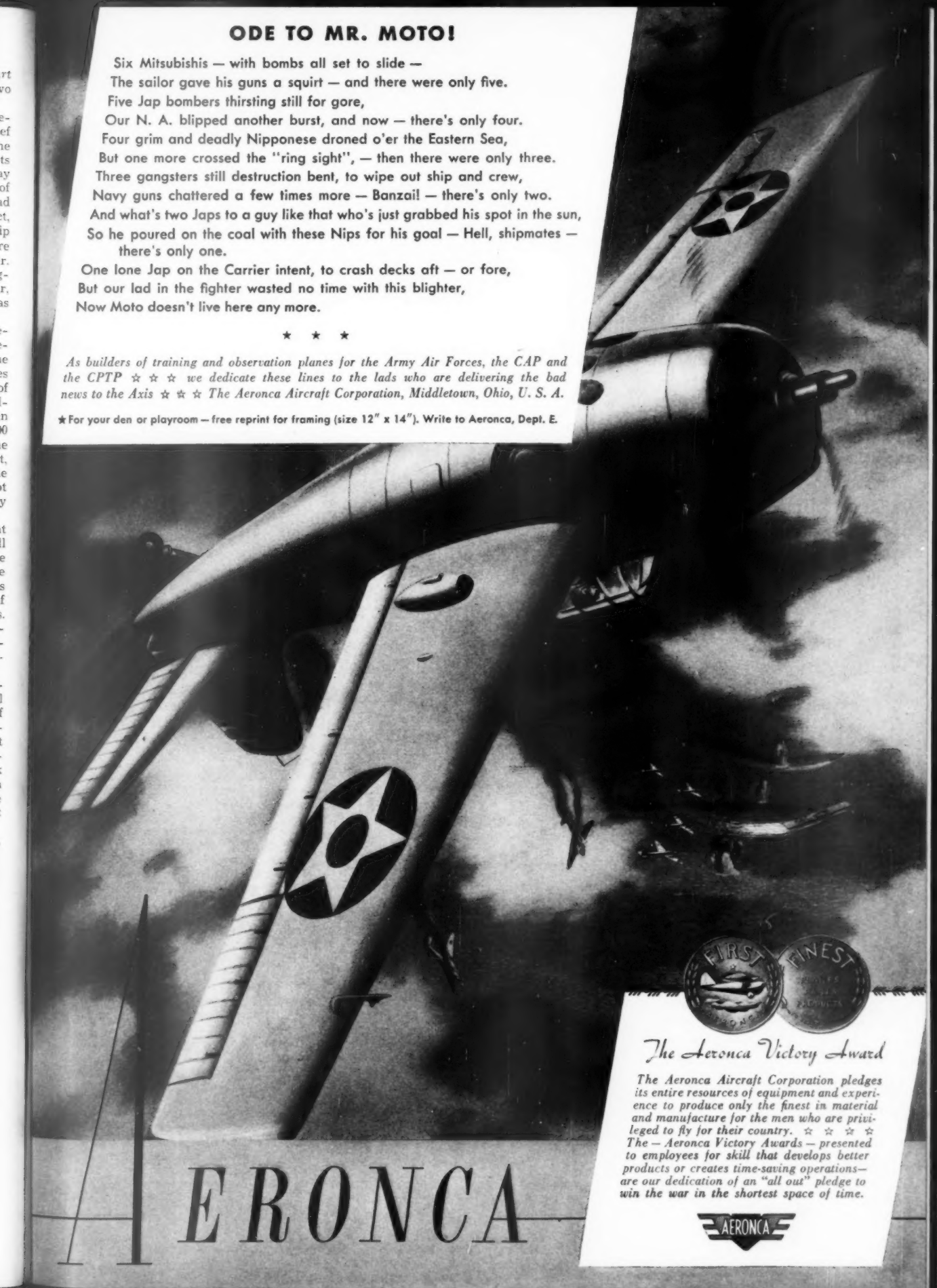
Pleading for more equipment and larger personnel, Mitchell told the committee that future wars would be fought in the sky and that only air forces could cope with the threat of enemy planes and submarines. Surface navies were useless, because the most modern battleship could be sent to the bottom by aerial bombing.

The next month, testifying before a committee studying a bill by Representative Curry of California to establish a separate air force, Mitchell said it was impossible for the committee to get complete and frank answers about aviation from Army and Navy flyers because they were afraid of indirect disciplinary action.

Air power, said Mitchell, would never attain its full development in the United States as long as it was forced to remain secondary to existing agencies of national defense. In the Army and Navy, he said, every act, every policy, every idea was based on precedent—and there was no precedent for development of air power. The clear implication of his testimony was that the ground and sea officers of the two departments were engaged in a tacit conspiracy to throttle development of the air arm in order to save their own positions and their own importance.

Mitchell was openly and deliberately tramping on the toes of his superiors. Secretary Weeks of the War Department, Secretary Wilbur of the Navy, President Coolidge, the Army General Staff and the Navy General Board—whatever their views on air power—were all opposed to the idea of a unified, independent air arm.

Maj. Gen. Hugh A. Drum voiced the War Department's opposition before the



ODE TO MR. MOTO!

Six Mitsubishis — with bombs all set to slide —
The sailor gave his guns a squirt — and there were only five.
Five Jap bombers thirsting still for gore,
Our N. A. blipped another burst, and now — there's only four.
Four grim and deadly Nipponese droned o'er the Eastern Sea,
But one more crossed the "ring sight", — then there were only three.
Three gangsters still destruction bent, to wipe out ship and crew,
Navy guns chattered a few times more — Banzai! — there's only two.
And what's two Japs to a guy like that who's just grabbed his spot in the sun,
So he poured on the coal with these Nips for his goal — Hell, shipmates — there's only one.
One lone Jap on the Carrier intent, to crash decks aft — or fore,
But our lad in the fighter wasted no time with this blighter,
Now Moto doesn't live here any more.

★ ★ ★

As builders of training and observation planes for the Army Air Forces, the CAP and the CPTP ☆ ☆ ☆ we dedicate these lines to the lads who are delivering the bad news to the Axis ☆ ☆ ☆ The Aeronca Aircraft Corporation, Middletown, Ohio, U. S. A.

★ For your den or playroom — free reprint for framing (size 12" x 14"). Write to Aeronca, Dept. E.

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FIRST FINEST

The Aeronca Victory Award

The Aeronca Aircraft Corporation pledges its entire resources of equipment and experience to produce only the finest in material and manufacture for the men who are privileged to fly for their country. ☆ ☆ ☆ ☆ The — Aeronca Victory Awards — presented to employees for skill that develops better products or creates time-saving operations — are our dedication of an "all out" pledge to win the war in the shortest space of time.

AERONCA

committee and to back it cited an instance in France in which Mitchell took his entire air force off for a foray against the enemy. The Americans on the ground, left without air protection, were promptly attacked by German planes.

Adm. Hilary Jones, appearing for the Navy, not only urged the committee to reject the Curry bill, but suggested that it admonish "all malcontents and agitators in the Government service to attend strictly to business or get out of the service." He did not mention Mitchell's name, but there was no doubt in anyone's mind who was meant and the admiral's suggestion hardly oiled the troubled waters.

Secretary Weeks objected to Mitchell's statements and implications and demanded an explanation. The reply was a reiteration of his assertions that the department and the General Staff were inefficient, over-conservative and unwilling to adopt a proper national policy toward air defense. He told the secretary that the Navy had tried deliberately to hinder the bombing experiments off the Virginia capes in 1921 and that the War Department, instead of supporting its own officers in the matter, had forced them to operate under Navy orders.

Coming back to the committee, Mitchell added to his previous assertion that air officers were unwilling to testify frankly, a new charge that other officers falsified their testimony deliberately. It was impossible to develop a proper air service, he said, as long as it was merged with the ground forces.

The controversy was hitting the front pages of the nation's newspapers now. Secretary Weeks, not mentioning names, denounced "supercilious criticism" of the General Staff. Naval officers appeared before the committee to protest that Mitchell, not the Navy, failed to co-operate according to agreement on the bombing experiment. If they were no masters of the air, said the sailors, Mitchell was no nautical expert, either.

On the other hand, General Patrick supported the proposal for a unified air service and even Maj. Gen. John L. Hines, the Chief of Staff, admitted that the War Department had not done all it should to develop air power.

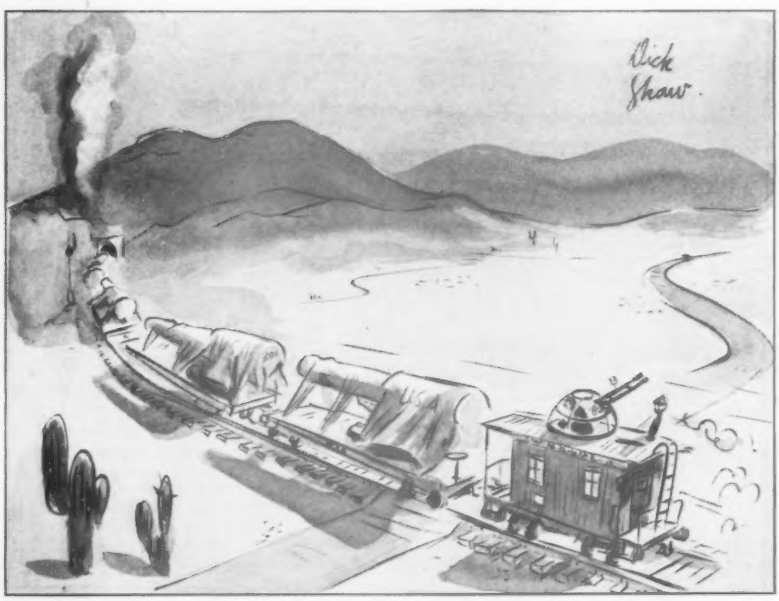
The Navy General Board added fuel to the flames with a report that the battleship was still the final arbiter of sea warfare, with all other vessels—including submarines and aircraft—auxiliary to it. Mitchell ridiculed the report, said no bombs were dropped on the battleship *Washington* in the tests on which the report was based, and dared the Navy to give Army bombers a chance at the target, promising to "blow it out of the water."

Without a dominating air force, said Mitchell, "armies and navies are merely organized for defeat in modern war." Strangely prophetic, that remark!

Adm. William S. Sims came out of retirement to add his opinion that aircraft carriers were the capital ships of the future, that battleships were obsolete and bombs could sink any ship afloat.

Mitchell's term as assistant chief of the Air Service, as it was still called then, was to expire in April, 1925, and there was little surprise when Secretary Weeks, instead of reappointing him, named Lieut. Col. James E. Fechet to succeed to the post. This was interpreted immediately by Mitchell's friends as punishment for his temerity in criticizing the department, further evidence of the "conspiracy" to "get" Mitchell. It is entirely possible that, had Mitchell been less outspoken, he would have retained the job, and there was enough evidence of official displeasure to lend color to the idea that the department was trying to discipline its stormy petrel. However, it is normal War Department procedure to send an officer back to field duty after a tour of staff work in Washington.

At any rate, Mitchell reverted in April to his permanent rank of colonel—he had held the temporary rank of brigadier general only by virtue of his assignment—and went to San Antonio as air officer for the Eighth Corp Area which, as Secretary Weeks noted in an obvious effort to soften the effect of the transfer, had the greatest concentration of troops and the largest air activity of all the corps areas.



Mitchell, only 45 at the time, not only was still a young man, he was extremely young for his rank as peacetime Army careers go. He was a brilliant officer, with an enviable record, and there is little reason to doubt that if he had curbed his intemperate speech and kept his uncomplimentary opinions of his superiors to himself, his ability and his record would have made him the only possible choice for chief of the Air Service within a very few years. His prestige in that post, plus his great popularity, well might have hastened some of the changes he sought.

It was not his nature, however, to be anything but outspoken and his possession of independent means undoubtedly freed him of the fear that another officer might have known—that disciplinary action against him might end his career and his income. From his new post he continued his heckling of the two defense departments, in effect appointing himself chief of a movement to snatch the growing Air Service from what he deemed to be a stranglehold of bureaucratic inefficiency and red tape, and give it room to grow in an independent status.

Early in May Secretary Wilbur had announced that in the future all midshipmen at Annapolis would be instructed in aviation, whereupon Mitchell issued a statement calling the plan "bunk" and describing it as a move against an independent air service. Later, when Rear Adm. C. F. Hughes issued a report on some antiaircraft tests, in which he claimed a high degree of success, "bunk" was again Mitchell's reaction.

"That's all bunk," said the colonel. "It's worse than bunk; it's propaganda issued in a desperate effort to discredit the Air Service.

"All this propaganda about the effectiveness of antiaircraft guns is misleading and does more harm than good. All aviators know how small their chances are of being hit by antiaircraft fire. They (the Navy) could do more good by spending some of that money on submarines and get under the water with them."

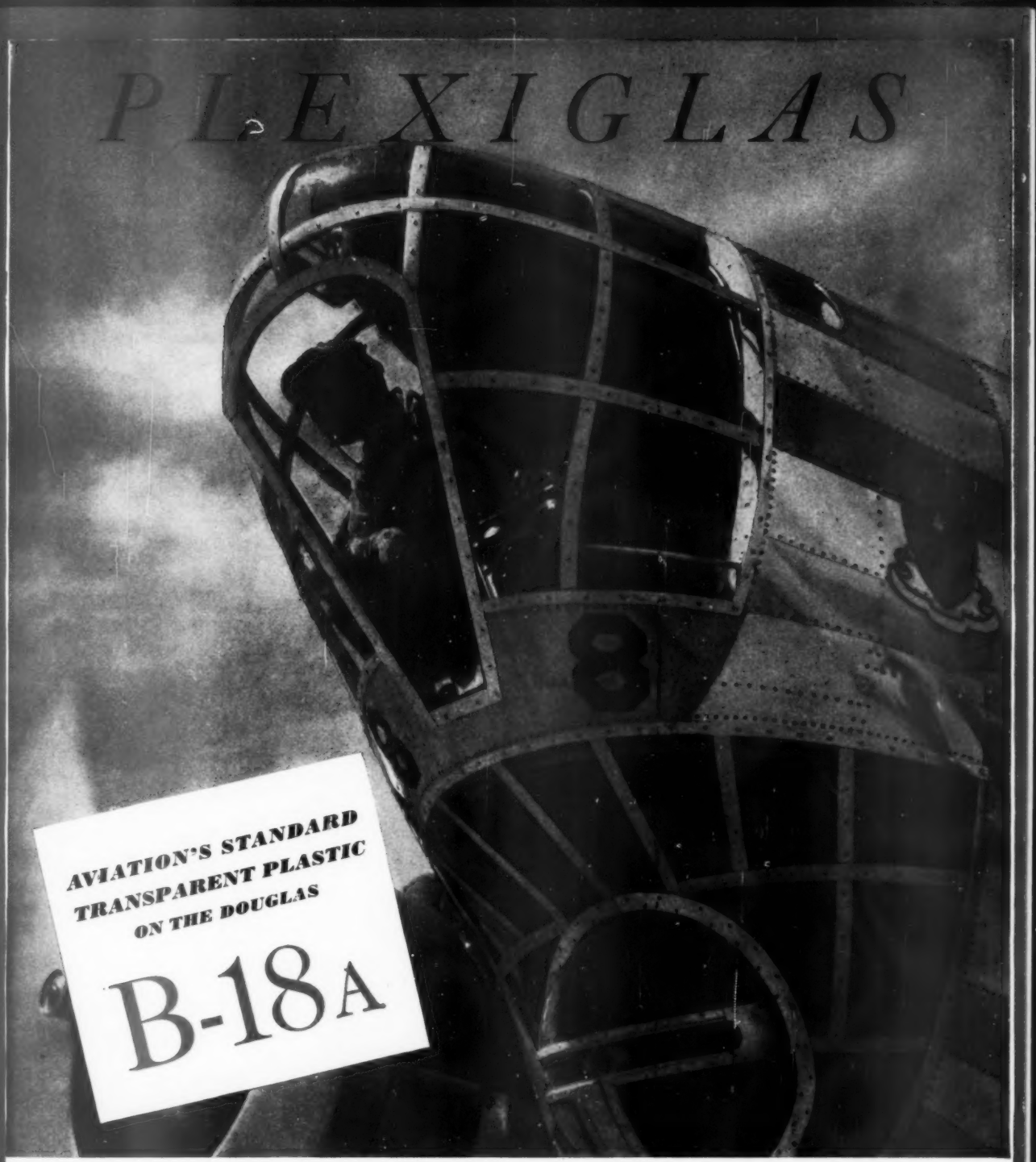
Three weeks later he was blasting at a similar report from the Army as "mere kindergarten stuff," and by the end of August he was announcing in Chicago that a plane which could fly non-stop to Paris, or fly with only one way-stop to Pekin, had been developed by aeronautical engineers, but the Army would not permit it to be tested.

"Old fogey ideas are holding back the inevitable," he cracked.

Mitchell's new book, "Winged Defense," appeared on the bookstands September 1, and he was charged by his superiors with violation of standing regulations requiring officers to submit such material for approval before publication.

In the book, Mitchell aired his views on air power and the whole war power of the nation, asserting among other things, that "the influence of air power on the

(*Continued on page 65*)



FIGHTER pilots sit in PLEXIGLAS cockpit canopies; bombardiers are almost surrounded by PLEXIGLAS nose enclosures; navigators make their observations through PLEXIGLAS domes; gunners fire from within PLEXIGLAS power turrets or tail enclosures.

Aircraft designers like PLEXIGLAS because its light weight saves many pounds for bigger bomb loads and longer fuel supplies. It's tough enough to protect the crew from the terrific pounding of stormy air currents. Its transparency is permanent—in good weather or bad, snow or sleet, PLEXIGLAS retains its clarity. And it can be cut and formed to streamlined shapes that reduce wind resistance and drag.

Clearer than ordinary glass and less than half as heavy, PLEXIGLAS has—for more than six years—seen active service in every type of aircraft. It is "Aviation's Standard Transparent Plastic."

PLEXIGLAS is the trademark, Reg. U.S. Pat. Off., for the acrylic resin thermoplastic sheets manufactured by the Rohm & Haas Company.

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA, PA.

Manufacturers of Leather and Textile Specialties and Finishes . . Enzymes . . Crystal-Clear Acrylic Plastics . . Synthetic Insecticides . . Fungicides . . and other Industrial Chemicals

The Complete Story

HERE'S A PARTIAL LIST OF CONTENTS* OF THE SPECIAL RAF (SEPTEMBER) ISSUE OF FLYING:

Introduction by Sir Archibald Sinclair, Secretary of State for Air.
Survey of the RAF by the Air Member for Supply and Organization.

*Subject to changes as new developments arise or additional information becomes available.

OPERATIONAL COMMANDS

Articles by the Air Officers Commanding in Chief on Fighter, Bomber and Coastal Commands, Army Cooperation, and RAF Operations in France, Russia and the Middle East.

ANCILLARY COMMANDS

Describing Maintenance, Balloon, and Ferry Commands; Allied and Dominion Squadrons.

AIRCRAFT PRODUCTION

Foreword by Col. J. J. Llewellyn, Minister of Aircraft. Operational Aircraft, Armament, Engines, and Salvage are explained.

PERSONNEL

Training and Manpower; The Man in Action; Medical Aspects of Flying; Notable War Pilots and Air Crews are discussed.

SUPPORTS FOR RAF

Air and Sea Rescue; Intelligence; Research; Experiment; Meteorology; Civil Aviation; The WAAF; Aerodrome Development; Camouflage.

Plus

Hundreds of photographs in brilliant full color and black & white

ON SALE AT ALL

of the RAF

Prepared in England by the outstanding military authority in each branch of the RAF—men who are actually directing the war operations . . .

The September FLYING will be a truly great document of the war, one that will be read and cherished by everyone who has thrilled to the accomplishments of the RAF and who has participated in the magnificent effort of the aviation industry that made these accomplishments possible.

★ *AS A SALUTE TO THE RAF,* those gallant heroes who have time and again turned the tide of battle, the revelations in this issue are inspiring!

★ *AS A BEAUTIFUL VOLUME,* it will be treasured for years. Hundreds of photographs, including many full-color illustrations, are contained in this issue.

★ *AS A HISTORICAL DOCUMENT,* its value is immeasurable. Comprehensive in every detail, this issue tells a vital portion of the war's story.

★ *AS A REFERENCE SOURCE* on the RAF, it will be read repeatedly. Information contained in this issue is available from no other source.

SEPTEMBER

SPECIAL ROYAL AIR FORCE ISSUE

FLYING

NEWSSTANDS AUGUST 11—RESERVE YOURS NOW—50c PER VOLUME

MAN-HOURS were required to sort by hand the thousands of rivets swept each day from floors of Martin factories. Slow, tedious work, manual rivet-sorting was costly, inefficient.
MACHINE-MINUTES replace man-hours sorting rivets at Martin's. Mechanical rivet-sorter developed by Martin, operates at high speed, does work more accurately in a fraction of previous time.

LITTLE GADGETS DO A big JOB

in accelerating Martin production

TYPICAL of the many small devices developed by Martin to save production time, is the Martin mechanical rivet-sorter. This ingenious device takes the accumulation of rivets swept daily from factory floors and separates them according to diameter, head shape, and shank length. Operating at high speed, the Martin rivet-sorter saves much time when compared to tedious, inefficient hand sorting.

Such things as rivet-sorters, while individually of minor importance, take on tremendous significance when multiplied a hundredfold. In every department of Martin plants, from engineering to assembly, minor time-and-labor-saving methods yield an impressive total of man-hours saved. By constantly studying and improving every operation, however small, Martin is saving time and increasing output for Victory.

The Glenn L. Martin Company, Baltimore, Md., U. S. A.

Martin
AIRCRAFT

Builders of Dependable Aircraft Since 1909

(*Continued from page 60*)

ability of one nation to impress its will on another in an armed conflict will be decisive."

In a later book, "Skyways," he was to pay his disrespects to the Navy again with a remark that "navies have never been anything except an auxiliary of armies in their role of controlling communications across the water," adding his opinion that aircraft carriers were "another great delusion which the navyists attempt to foster."

Typical of Mitchell's more sober statements of his views on air power and military policy, however, was this one in "Winged Defense":

"The time has passed when any one service can be thrown off to work out its own salvation without respect to the others, as has been the case very largely in the past with armies and navies. Air, land and water must be hitched together under one general command and direction to provide for an efficient defense."

On the day his new book was published, Mitchell issued a statement denying the War Department's charges that the volume was printed in violation of regulations.

"I have disobeyed no orders," Mitchell said. "The truth of our deplorable situation is going to be put before the American people, come what may. If the War Department wants to 'start something,' so much the better. Then I can get the case before Congress and the people and then we will have a chance to remedy this unfortunate condition.

"This book is just the beginning. I am at present preparing a series of articles which will rip the cover off these deplorable conditions."

The cover was to be ripped off in a somewhat different fashion, however.

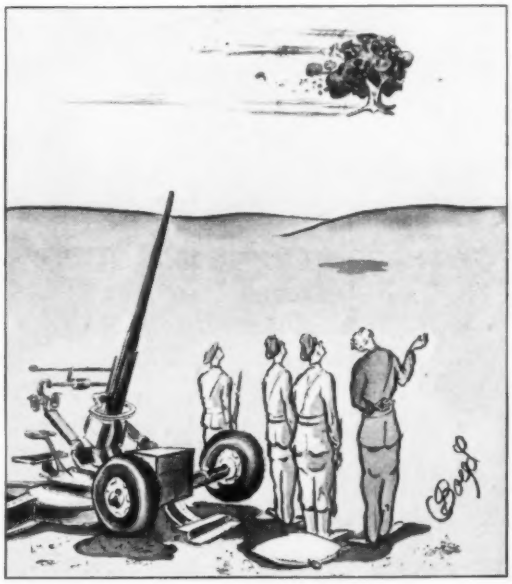
It was 1925. The Pact of Locarno was being drafted and signed. Speakeasies, bathtub gin, home brew and gangsters were hitting their lamentable stride. Skirts were short and hair was bobbed and John Held, Jr.'s cartoons presented the current ideal of the female form divine. Calvin Coolidge was in the White House and Jimmy Walker was busy getting himself elected mayor of New York for the playboy era. Leonard Kip Rhinelander was suing for an annulment of his marriage to a girl with Negro blood, and the unwrapping of Tutankhamen's mummy was a front page story. Aviation was news, too, with Jimmy Doolittle setting speed records and, somewhere in the Pacific, Comm. John Rodgers and his crew were lost at sea with the Navy's flying boat PN-9, No. 1 on an attempted flight to Hawaii.

Against this background occurred one of the most tragic disasters in the history of American aviation. On September 3 the Navy's dirigible *Shenandoah*, wrenched in half by a violent storm, fell in wreckage in Ohio with 14 of its crew killed, including the commanding officer, Lieut. Comm. Zachary Lansdowne.

Two days later, Mitchell chose to "rip the cover off" with a statement that the crash of the *Shenandoah* and the loss of the PN-9 (the crew of which later reached shore safely) were "the direct result of incompetency, criminal negligence and almost treasonable administration by the War and Navy Departments."

This was no mere grousing from a discontented officer. This was a defiant challenge from a man, bitter over real and fancied handicaps to a service he believed in, and sincere in his views of the tremendous importance of air power, determined to force a showdown by flinging at his superiors charges so grave that they could not possibly be ignored.

There can be no question that Mitchell, a veteran of more than a quarter of a century in the Army, knew that his statement constituted a flagrant violation of the Articles of War. The conclusion is inescapable that he did know it, that he deliberately forced the War Department to try him before a court-martial and that he counted on the soundness of his views on air policy and public horror over air disasters to force establishment of an independent air arm and bury the formal charges against him—which were sure to come—in the settlement of the larger issue as he saw it.



". . . That's the new camouflage for the North American 'Mustang' . . ."

Starting with a blanket accusation that the officials of both departments were incompetent, criminally negligent and very nearly guilty of treason, his statement proceeded for 17 closely-typed pages of bitter denunciation.

"As far as aviation is concerned," he said, "the conduct of these departments has been so disgusting in the last few years as to make any self-respecting person ashamed of the clothes he wears.

"Were it not for the great patriotism of our air officers and their hope for a change in conditions sooner or later, I doubt if a real man would remain with the colors under existing conditions.

"All our policies, schemes and systems are dictated by the non-flying officers of the Army or Navy, who know practically nothing about it. The lives of airmen are being used merely as pawns in their hands."

Congress, he charged, was "treated by these two departments as if it were an organization created for their benefit, to which evidence of any kind, whether true or not, can be given without restraint.

"Officers and agents sent by the War and Navy Departments to Congress have almost always given incomplete, misleading or false information about aeronautics, which either they knew to be false when given or was the result of such gross ignorance of the question that they should not be allowed to appear before a legislative body.

"The airmen themselves are bluffed and bulldozed so that they dare not tell the truth in the majority of cases, knowing full well that if they do they will be deprived of their future career, sent to the most out of the way places to prevent their telling the truth and deprived of any chance for advancement, unless they subscribe to the dictates of their non-flying bureaucratic superiors. These either distort facts or openly tell falsehoods about aviation to the people and to the Congress."

There were more charges, including an assertion that the most recent Naval maneuvers had been a mere parade of the fleet up the Pacific coast and out to Hawaii, but all of them were in the same flamboyant, bitter vein.

The cover had been ripped off with a vengeance. The reaction was immediate and terrific, but Mitchell must have been somewhat astonished that so much of it was unfavorable, even outside the departments. Officials of the departments refused at first to comment, but Maj. Gen. John L. Hines ordered the Inspector General of the Army to make a full investigation to determine whether formal charges should be brought against the colonel.

Among the officers of both services, most of whom had been blanketed into the sweeping invective of the colonel's broadside, there was of course furious indignation. Even Mitchell's friends, including many of his fellow air officers, told newspapermen privately they thought he was hurting his own cause by what they termed "loose talk."

Due to the fact that the September issue will be devoted exclusively to the story of the RAF, "The Billy Mitchell Case" will be concluded in the October issue of FLYING. —Ed.

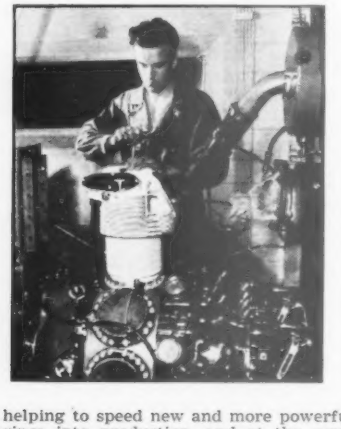
Industry Items

Industry's Production

On June 8, six months after the Japanese attack on Pearl Harbor, Col. John H. Jouett, president of the Aeronautical Chamber of Commerce, announced that the American aircraft manufacturing industry had increased military plane production nearly 85 per cent in the intervening period. At the same time, Col. Jouett declared that American production soon would exceed that of the combined enemy, Germany, Japan and Italy, including the production being forced out of Axis-occupied countries. Of particular interest was Col. Jouett's revelation that in the same six months' period since December 7, 1941, employment of women in the American aircraft industry had increased by 900 per cent.

Single-Cylinder Test Stands

The operation of single-cylinder aircraft engine test stands in the plants of Wright Aeronautical Corporation, Paterson, N. J.,



is helping to speed new and more powerful engines into production, and at the same time steadily improve parts, and consequently, the performance of power plants now being turned out for U. S. warplanes.

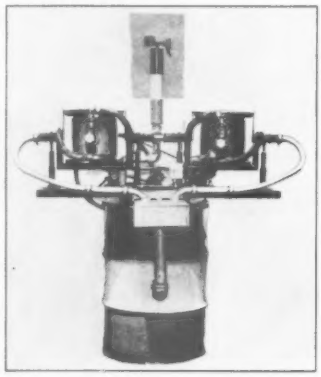
These stands duplicate a regular, full-sized Wright *Cyclone* 9 in every respect, except that eight of the engine's nine cylinders have been removed and the drive shaft, instead of spinning a propeller, exerts its force against a brake mechanism for registering horsepower. With these single cylinders, engineers run tests on pistons, spark plugs, valves, piston rings, piston pins, intake and exhaust ports, and cooling fins. Tests of hundreds of variations and combinations of these items are run in a short time, saving not only the expense of operating a complete engine, but saving valuable days of test time and releasing for production use on full sized engines the regular test cells of the company. In addition, a test on a specific part can be run to the point of failure on the single-cylinder stands, without the danger of ruining a complete engine needed for flight use in a bomber or fighter.

"Airacobra" in Color Film

The Bell Aircraft Corporation, Buffalo, N. Y., manufacturers of the famous P-39 *Airacobra*, have just completed a new 16 mm. motion picture in sound and color, entitled "Cannon on Wings." The picture runs about 25 minutes and is declared one of the finest of its type ever produced. Responsible groups, clubs, etc., desiring to show this film, are invited to address their request to Henry W. Comstock, Vars Building, Buffalo, N. Y.

For Cleaning Oil Radiators

Cleaning the interior of aircraft oil radiators has been made much simpler and more efficient through a special machine devel-



oped for this purpose by the maintenance department of TWA, Inc., at Kansas City, Mo. The machine (above) consists essentially of a drum, which acts as a fluid reservoir; an old aircraft cylinder and piston, which are operated by an electric motor through a "V" belt and worm gear; two pivoting cradles to hold the radiators, and a ratchet and pawl mechanism to revolve the cradles.

The machine utilizes a cleaning solution pumping mechanism so designed that a reversal of flow is obtained 20 times a minute. This slushing action keep all particles and liquid agitated, thus breaking loose foreign material that cannot be dislodged by unidirectional flow. It also allows more thorough washing of the radiator core tubes. The machine will handle two radiators at a time.

Employees' Paper

First issue of the "Fleetwing News" a tabloid-size newspaper published by Fleetwings, Inc., for all its employees, including former employees now in the armed services, was distributed last month. It will be published every second week.

New Ryan Army School

Establishment of a new Air Force primary pilot school near Tucson, Arizona, was recently announced by the Ryan School of Aeronautics, San Diego, Calif. First classes are expected to be in session by September.

"Keep 'Em Rolling"

The B. F. Goodrich Company, Akron, O., has produced a moving picture titled "Keep 'Em Rolling," which stresses the absolute need for tire conservation and showing the 12 basic rules for their care. The film is available in 16 mm. size upon the request of any organized group, such as civilian defense units, civic or luncheon clubs, etc.

Small Turret Lathe

A new bench model turret lathe for rapid production to close tolerances on chucking operations or bar work has just been announced by the South Bend Lathe Works, South Bend, Ind. This lathe has a 10 inch swing over the bed and saddle wings, 1 $\frac{3}{8}$ inch hole through the headstock spindle, and 1 inch collet capacity. It is well adapted to second operation work, particularly so because of a large assortment of attachments and accessories which simplify tooling for specialized work.

Loans for Manufacturers

The Bureau of Finance of the War Production Board reported that during the month of May it assisted manufacturers engaged in war production to obtain $54,476,358 of financing from local banks, Federal Reserve Banks, the RFC, the Army, Navy, Maritime Commission, and other public and private agencies. The Bureau has representatives in 35 WPB field offices. It makes no loans itself but directs qualified firms to public and private agencies that do.

Borg-Warner Dividend

Directors of the Borg-Warner Corporation, Chicago, declared a dividend of 40 cents per share on the common stock, payable July 1, to stockholders of record as of June 18, 1942.

Bundyflex Metal Tubing

Filling the slack caused by shortages of brass, copper and aluminum tubing is Bundyflex metal tubing, made by Everhot Products Company, Chicago, Ill. This tubing is a soft annealed steel tubing coated with copper inside and out. It is made by laterally rolling a copper coated steel strip into the form of a double walled tube, which is then brazed.

Power for Air Station

The skilled workman pictured herewith operates at close quarters in a Westinghouse plant as he nears completion of

wound stator for a 3,750-kilowatt turbine generator built to give a Naval Air Station its own source of power. Here the tape-wound copper coils are shown being inserted in iron slots.

Cleaning Sensitive Metals

Because aluminum and magnesium are sensitive metals which, unless extreme care is exercised, become pitted, etched or discolored when cleaned with harsh alkaline solutions before and after heat treatments, the announcement by Oakite Products, Inc., New York, N. Y., of newly developed and improved methods for effectively handling these operations on a safe basis is of timely interest. Of equal importance is the fact that these simple procedures now being successfully used are available to speed-up production of aircraft and accessory parts. Complete technical data may be obtained by writing the manufacturer.

Lathe Operation Movies

Two new 16 mm. sound films in color, "The Lathe" and "Plain Turning," are available on a free loan basis for apprentice training in industries. They show what a lathe is for, how to operate it and the performance of basic lathe operations. Showing time for both is approximately 40 minutes. A movie bulletin giving complete information on how to secure these films is sent on request by the South Bend Lathe Works, South Bend, Ind.

FIRST

Since the Birth of Aviation

1923 • First Army Hawk, 420 h.p. Flown by Lt. R. L. Maughan in first coast-to-coast, dawn-to-dusk flight—150 m.p.h.

1929 • Six years of development finds this P-6 Hawk with greater horsepower—625—and many improvements.

1937 • Retractable landing gear (a 1933 development on the Navy Hawks), a speed of over 300 m.p.h., a 1100-H.P. engine, were among the notable advances on the P-36 series.

1941 • Since the production of the original P-40's, this famous series has undergone four successive "step-ups" to new high performance levels in speed, ceiling and striking power.

WARHAWKS *for Victory*

From the start, Curtiss P-40's have been in the thick of nearly every important air combat the world over. Back home, without a halt in desperately needed production, these famous fighters have undergone many successive step-ups in performance. Now a still greater P-40, the Warhawk, with its hard-hitting fire power, will soon be winning new victories in America's march toward all-out air supremacy.

SECOND PRINTING

● Send 10¢ for **your** copy of this fascinating 96-page history of aviation by Assen Jordanoff, author of "Your Wings", with illustrations of current fighting types. Airplane Division, Curtiss-Wright Corp., Buffalo, N. Y.

CURTISS-WRIGHT
Corporation
AIRPLANE DIVISION

...who stay at home and work

This design may be adapted and used free of charge by any organization engaged in war work—upon written request. To protect such users, this design has been copyrighted and a design patent applied for.

WAR
McDONNELL AIRCRAFT
WORKER

Where can I help most? That's the question on the lips of men and women all over America. Obviously, all can't serve in our armed forces. For a vast army is needed here at home to make 'planes, tanks, guns, ships and shells. You may be needed more for production lines than fighting lines. That's for your government and you to decide. But make no mistake. The war workers' contribution is second to none.

That's why at McDonnell, employees engaged in the manufacture of *precision-built* aircraft and parts for our armed forces—are proud to wear this badge. You may see such badges soon . . . elsewhere throughout America . . . honored symbols of service worn by men and women who are working night and day for Victory.

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McDONNELL AIRCRAFT CORPORATION

SAINT LOUIS

From Headquarters

(Continued from page 40)

War I, is one of those who believes that war is war and no foolin'. He was on a military detour of great importance and he is a good shot. A la Sergeant York he proceeded to kill them all, starting with the last man first.

* * *

From a point on the globe—just 8,000 miles straight through the earth—or directly, on the globe, opposite I hear of old Ash McKinley. He is a major now in the Air Forces. He was suffering from a slight defect of hearing, but General Arnold last summer allowed him a waiver, mostly because he was such an efficient officer but also because he was the Army photographic officer who first flew over the South Pole with Admiral Byrd. His work is censored so far but will be told some day very soon. This, coupled with the work of Jimmy Doolittle over Tokyo and our Eagle Squadrons over England and the European continent, awaken us to the extent of modern air warfare and the far-flung battle lines of our Army Air Forces.

* * *

Since writing last month, the RAF's "1,000-plane-per-good-night" bombing program as promised then has become a reality. There has been a great deal of newspaper comment and editorial writing but very little has been written by the high-up airmen who know what they are about, why they choose this as a second front or what the logic about it all is. Some of the most elementary prerequisites of such fighting are entirely overlooked by the average correspondent although this—the second air front—is indeed the turning point of the war if not the beginning of the end.

One factor completely overlooked by all the writers whose material I have studied is the effect of greater allied air supremacy over Germany.

Air supremacy is a term used here in Washington very lightly but by active tacticians overseas very seriously. Unlike Naval supremacy it is very fleeting and shifts from one side to another, sometimes daily; again, perhaps weekly or, in quiet sectors, monthly. Sometimes Air supremacy is prerequisite to victory; sometimes, it actually does not matter much who holds it. It is a new concept in human relationship and can be gained only by destroying enemy airplanes. "E. A's"—the pet name our pilots have for enemy aircraft or hostile aircraft, can be destroyed only in two ways—one by destroying them in their nests, the other by shooting them out of the sky. They can be diverted elsewhere when economy of forces dictates that they are more useful elsewhere just as they are being kept in large numbers on the Eastern front today by the Russians' pressure on the German front out there. But to obtain supremacy of the air "EA" must be knocked out completely.

If the Allies obtain complete supremacy of the air over and beyond the channel, the success of the second front by air will mount up nightly until it may become completely unbearable and the Nazis, by this and by other factors coming along, be defeated before Christmas.

If the United Nations, however, obtain only about 50 per cent air supremacy over Europe they will not be able to send "1,000-planes-per-good-night." With a 50 per cent drop in aerial supremacy over Germany the drop in effectiveness of the air second front will not be 50 per cent but 75 per cent and we will only get on an average 250-planes-per-good-night and neither will we be able to penetrate so far inland.

"My life has been noticeably devoid of excitement . . ."

* * *

Strange as it may seem, workers in the American aircraft industry actually got into this war before our Army or Navy air forces, they are still fighting, will continue to fight and their part—making more and more airplanes right over here in America—possibly is one of the biggest parts now being played in the war.

* * *

When the war broke out in Europe in 1939, one can recall at meetings of the QB's, EB's, the Aviators' Post of the American Legion and other gatherings of old-timers that everyone was pretty well resigned to the fact that the old boys would have little chance of getting back into the service should the United States become involved. Such, however, has proved erroneous. Many have joined up and already obtained promotions.

Tom Lanphier is back as a major. Everyone in aviation will recall him; his work as commanding officer of the First Pursuit Group, Selfridge Field, from 1927 to 1929, and his part in organizing "TAT," now TWA airlines. Others will recall his work at Field 9, Issoudun, France, World War I, or possibly his association with Lindbergh and Colonel Breckenridge after the Lone Eagle flew the pond.

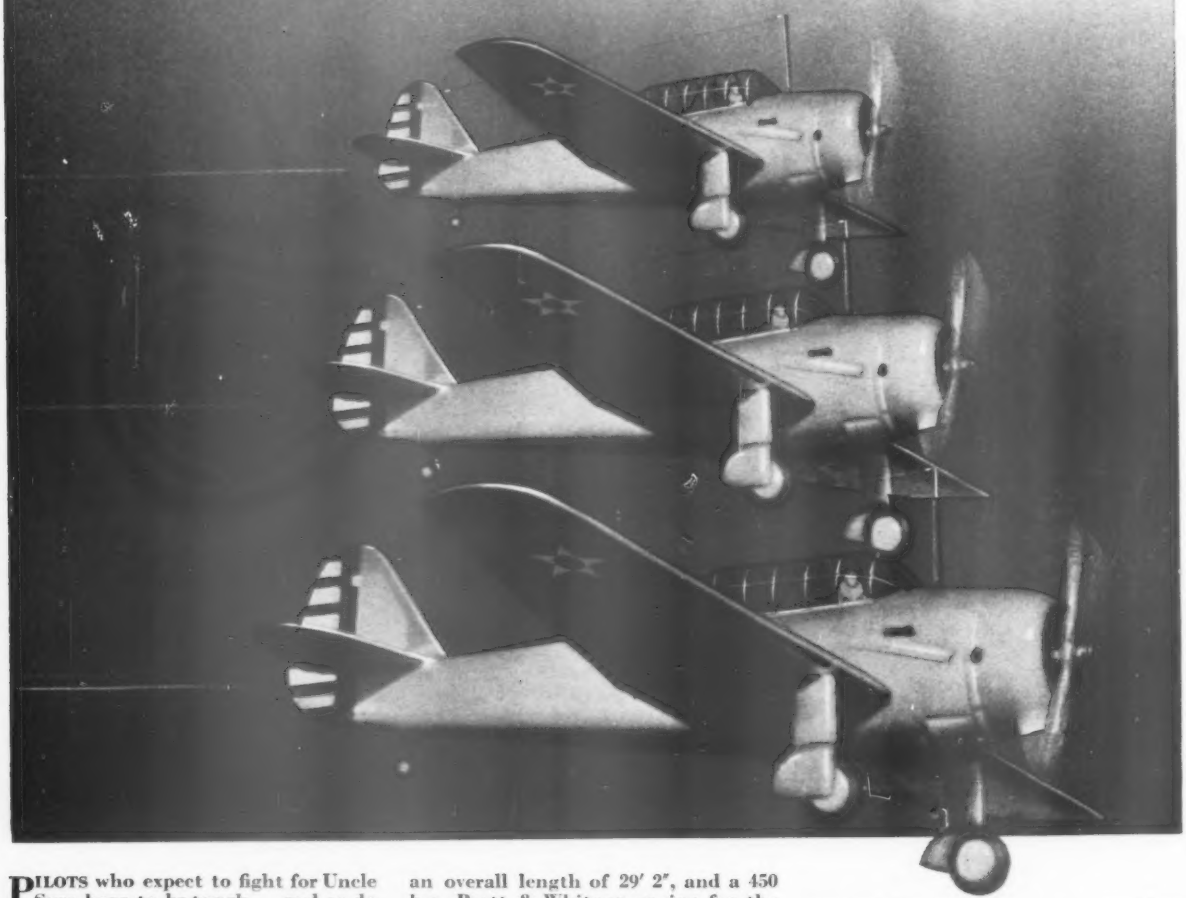
A. H. "Sheep" Alexander is now a major in the Air Forces (he was the bombing ace of the last war). "Happy-haven" Sam Moore is already a lieutenant colonel, as is Phil Bush. Aviation editor Capt. Dick Kirschbaum of Newark, N. J., is on duty with Colonel Ennis here in Washington. Incidentally, Dick's book, entitled "Fifty Famous Flyers," with Jimmy Doolittle's picture on the cover is something everyone should have—what memories Dick's sketches therein bring back! Merien Cooper who, because he had kept up his commission in the years between came back as a captain, has already skyrocketed to a full colonelcy but none ever deserved it more. We miss him down here, he has gone to parts unknown like many another whose face was so familiar at headquarters last winter. Take, for example, Gen. "Mike" Scanlon, former Chief of A-2 and before that air attaché at London. They say here he already has 300 combat hours to his credit since February somewhere in a combat zone. Robert B. Hotz of Milwaukee, the first man to bring out good stories from Burma on the work of Chennault and his inimitable pilot officers, has been commissioned and is on duty here in the Chief's office.

* * *

The Navy has bagged some good old-timers, too, but it is going to be difficult for them to forget or make up for the loss of Lieut. Comm. Jimmy Taylor. He was the Jimmy Doolittle of the Navy. He flew everything he ever saw from Myer's helicopter to Lawson's airliner. He was one of those men whose loss no one can comprehend for months. At times your correspondent felt Jimmy Taylor was not appreciated but such was not the case. I flew up for his funeral at St. Bartholomews church in New York and never saw such a turnout for any flyer. As the white-uniformed Naval pallbearers carried Jimmy's flag-draped casket down the aisle there was not a dry eye amongst any of us. We had a strange feeling of being left all alone. As the silent crowds filed out and the organ notes faded away I could not but recall an old saying of Euripides written in 415 B.C. which I learned at school as a young lad, "It is of no consequence to the dead what the funeral is; costly obsequies are the affection of the living." This war will end some day, Cliff Henderson may get back to private life again and resume his annual air races at Cleveland, but they will never be the same without Jimmy Taylor's smiling but serious greeting for everyone.

FLEETWINGS

is building a training fleet of stainless steel!



PILOTS who expect to fight for Uncle Sam have to be tough . . . and so do their planes! Fleetwings, along with its parts production for leading military aircraft, is now building a basic trainer, the BT-12, for the U. S. Army Air Forces. . . . Flyers report that this new plane can really "take it."

Specifications of the sturdy, maneuverable BT-12 . . . the world's first military plane built principally of stainless steel . . . include a 40′ span, an overall length of 29′ 2″, and a 450 h.p. Pratt & Whitney engine for the power plant.

Designing and building this airworthy ship came naturally to Fleetwings engineers . . . because they have long been recognized as pioneers in developing the spot welding, stamping and fabricating of stainless steels for aircraft and parts.

Fleetwings continues to pioneer . . . even while keeping ahead of today's big production schedule . . . so that tomorrow's tougher and faster warplanes will reflect American ingenuity "revved up" to a new high!

★

FLEETWINGS

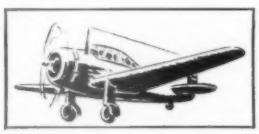
Incorporated

BRISTOL • PENNSYLVANIA

AHEAD OF PRIME CONTRACTORS' REQUIREMENTS is the record of Fleetwings' production men and women . . . who are intent on putting a dent in the Axis. Their speed is important, for they're building wings and control surfaces for many leading fighters and bombers.

"KNOW-HOW" PAYS OFF: Fleetwings has stepped up total output about two thousand percent in thirty months by putting these seven principles into practice:

(1) Mass-production of aircraft parts by mobile production.
(2) Simplification of each production job into one or two operations.
(3) Intensive use of experienced supervisors.
(4) An efficient training school to feed in pre-tested men and women.
(5) Moving jigs, conveyors and other mechanization to keep 'em rolling.
(6) Detailed budgeting of time, materials and money.
(7) A "flying squad" of engineers on special assignments . . . spotting production flaws and inventing improved techniques.



"ATTACK PLANT": Now that you know how Fleetwings builds 'em, you'll be interested in the alert attitude of the Fleetwings organization . . . from top to bottom. Back in March, we had our "Defense Plant" sign painted out, and substituted "*Attack* Plant." Fleetwings aircraft parts and hydraulic equipment are putting that slogan into sky-battles!

"KEEP 'EM FLYING!"

FLEETWINGS
Incorporated
BRISTOL • PENNSYLVANIA

Our pet old-timer the colonel mentioned some weeks ago, whom everyone in the Air Forces loves, who gets about the whole country more than any other one officer and who wears on his breast more ribbons than anyone except General MacArthur, had an experience this week. So many people ask him the names of his different medals that he carries about in his pocket a little printed card which he presents to the inquisitive after telling them: "For a dime I will answer that question," when they want to know what they are all about.

At San Antonio, Tex., he ran into Dorothy Lamour and she inquired, "What are all those medals for?" Promptly he produced the card, and she not only paid up but went out and brought in three others of equal charm. Our gallant officer left San Antonio forty cents richer and with three new telephone numbers. It pays to be courageous and gallant.

* * *

And now to become more serious, it seems to me that at no time prior to this month has aviation made such an imprint on our citizens' minds. To most people (except the good readers of this magazine) aviation has in the years between been a Jules Verne dream and just about as fanciful, or like a film I saw in Germany many years ago called Metropolis and depicting overhead and subterranean ramps, express highways and all the wonders of the modern city then so fantastic. Most people laughed at Jules Verne's dream and at the film Metropolis. They screamed at Mitchell's dream of modern air warfare with swarms of airplanes.

But with the "1,000-plane-per-good-night" raids the last of the fantasies has become a reality. Beautiful Cologne has gone forever. So terrific has been the results of big bombs dropped from a sky blackened by aircraft that one almost dreads the future. But, if we here in America are apprehensive what about the Germans—not the Nazis alone—but the rank and file of the great German folk to whom Hitler and his regime is but another milestone in the sweep of misguided political philosophy!

Imagine the blasted hopes, the agonizing disillusion, of these people who may recall the boasts of Reichmarshal Goering when he assured them that they need never fear air-raids larger than "a handful of small air-planes ineffectively dropping single bombs." After all, this is the first real invasion of German soil since the aggression of Hesse-Darmstadt in 1870 by Prussia, then as now the invader. Bismarck, whose arrogant influence has made its imprint on the Teutonic mind ever since, was then in the ascendent. German children were brought up with his militaristic viewpoint, but I imagine the attitude of those children who lived through the invasion of Cologne will not be so easily won over to the "Blood and Iron" speeches of Bismarck, nor the browbeating pace set by his followers, as were those in 1870. Of course one cannot class small groups of raiding aircraft with an avenging army, but the "1,000-planes-per-good-night" can easily be termed an armed invasion.

The late Kaiser's mother said Bismarck's influence ruined her son, Wilhelm II, and produced the first World War, and now others say that Wilhelm's influence ruined Germany and the resulting ruin produced Hitler, but the sad truth is that no one influences the German people and all wars are started by those who crave and believe in war. Invasion and the fiery reality of warfare is the only language they understand.

One cannot but feel a pang of pity at the possible destruction of the beautiful Cologne cathedral and the ancient Rhine castles (unless one recalls Westminster Abbey and the ancient town of Coventry) but the simultaneous destruction of Bismarck's policies (not unlike those of Al Capone) make one rejoice.

Totalitarian autocracy may work for a short time, for a pirate or one who thrives on the privilege of brute force in some small community, but it can have no place in a great commonwealth of nations where private enterprise and the human individual, enlightened by science, and the order of modern life, seeks from its government only protection and security, and has the knowledge that his government will reward the individual in proportion to his services to society as a whole. An international hold-up man may have seen the power of aviation before our people and attempted to use it as his weapon in world conquest—he may have had some of us scared for a time but the crisis is past—American plane production now is almost in its stride, and "it won't be long now," Armies and Navies notwithstanding.

Instead of Heil Hitler, it soon may be Heil Heel!

In place of the upraised, palm-outward, stiff armed salute, the right arm will be holding the nose and the left pointing downward.

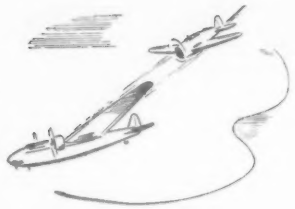
* * *

I doubt if there is any old-timer better-known to our readers than "12,000-hour" Homer Berry. His friends will all be glad to know that he is now back with our own Air Forces as a lieutenant colonel. Homer, on finishing his tests of the prototype model *Airacobra* for Larry Bell, joined up with the RCAF. He was seconded to the RAF in England and rose rapidly to be a wing commander, sneaking in (unofficially) on one or two sweeps over France. When not struggling to expedite the American machines into service, he flew everything they had over in England, including all types of German craft. Although he almost bumped himself off flying the new *Typhoon* with its fast revving Sabre "H"-type motor—"sounds like a sewing machine," he says—he likes it very much. The RAF were indeed sorry to see him come back to his own country and Air Forces, but, if given the chance, he will do even better work right here.

* * *

I have a pilot-friend who comes in to see me now and then. He has many successful transoceanic flights to his credit in this war. He got a thrill on his last flight not easily forgotten. At 25,000 feet half-way over the ocean both right outboard engines suddenly quit cold and the "props" stopped dead. Receiving no response from his engineer officer, he

(*Continued on page 74*)



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AVIATION FUELS · AEROSHELL OILS

Coming: A Merchant Aerine

(*Continued from page 30*)

political change, or even banditry make its use impracticable, not only in the affected country but in the lands beyond? Unless we abandoned our non-interference policy and undertook to protect the movement of our trade by an expensive hemispheric policing system, we would be powerless. An intercontinental air cargo operation, however, could be preserved by simply flying over or around intervening trouble zones.

With regard to assisting our Latin-American neighbors in the creation of much-needed internal transportation systems, one thought is worth keeping in mind. Investments in foreign highways and railroads are, in effect, investments in foreign real estate. Collection of such loans may be quite difficult, to say the least. But investment in occasional airports or landing strips, with mortgages on all movable equipment such as aircraft, seems a far more prudent policy.

The time-saving advantage of the freightplane over surface vehicles is obvious. Speed in the realm of transportation commands a high premium. A five- to 10-fold time advantage of the airplane insures a practically unlimited market for its fast service. When I worked on the assembly line of one of the country's largest aircraft factories, it was not uncommon for thousands of us to go slower and slower while parts or materials desperately needed from across the country chugged up hill and down dale. On one occasion the need was so acute that our company saw fit to hire a plane for the sole purpose of flying some duraluminum tubing all the way from Pennsylvania to California. Work slowdowns due to transportation inadequacies are all too frequent in our rearmament industries. Every one of them is a great injustice to the men on the front lines because they may in fact suffer for want of the very equipment affected by such delays.

The freightplane's advantages hold good in war as well as in peace. Like its counterpart that plods the high seas, a merchant aerine has usefulness in either case. It may be argued that in time of trouble a freightplane auxiliary has even greater value than any surface agency.

In modern warfare there is distinct advantage in interrupting the opponent's movement of industrial supplies. If main arteries of communication are destroyed, or even temporarily choked (as in the fall of France) a nation's life is endangered just as surely as though its armies were hurled back by force. Sky trucking does not rely upon the long, gleaming highways or railways that make convenient targets for enemy bombers. It involves no bridges or tunnels to be destroyed by sudden foray or sabotage. Movement is not paralyzed for precious weeks or months by a single bomb dropped on a dam, bridge or canal locks. The path of the cargo plane is as indestructible as the air itself. The only way to interfere with traffic borne by these carriers is to get at the vehicles. Destruction of their bases does not necessarily hamper them, for unlike their heavily wing-loaded cousins, the combat planes, they can land on any hard, level ground, a park, a ball field or a straight stretch of roadway.

Billions are being expended for our Liberty Fleet. Despite the existence of vast numbers of trucks, railway cars and ships, we are adding to these surface auxiliaries with all speed. As transportation is of vital concern, why shouldn't this country be spending a few billion on commercial freightplanes? We should and must begin today to create the fastest, most modern of all transport auxiliaries, a merchant aerine.

END

Insurance Precaution

OWNERS of airplanes which, because of the emergency, are stored at a base other than that mentioned in the insurance policy, are urged by Aero Insurance Underwriters to notify their local agent. A further warning points out that if the planes should be at an undesignated airport, where disassembly is required by the CAA, proper protection should be arranged to prevent theft or loss of various parts.

On Land and Sea Beechcrafts Are Doing Their Part

U. S. AAF AT-7A BEECHCRAFT Advanced (Navigation)
Trainer equipped with Edo Floats for Special Service

Beech Aircraft Corporation

BEECH AIRPORT • WICHITA, KANSAS, U. S. A.

From Headquarters

(*Continued from page 71*)

turned over to the co-pilot and hurried back into the cabin. Ice had made the plane heavy and she was losing altitude rapidly. What was his astonishment when he found his engineering assistant had completely passed out from lack of oxygen. Like many proud stalwarts he had felt he did not need it and early drowsiness soon gave way to complete oblivion. In falling he had brushed against two switches, killing both those motors. My friend waited with bated breath as he snapped them back on. "It was like music to the ears," he said, "when both engines picked up lustily," and he was able to carry through as though nothing had happened.

Wish I could report more on some of these flights. For example, one of our highest ranking generals just back from England saw the ground only twice—once when he took off over there and again when he landed here in Washington!

* * *

It will be some satisfaction to note that there has been no enemy-directed sabotage to date and the insurance industry has not learned of any incendiary fire in an American Industrial plant since the declaration of war, according to a report at the annual meeting of the National Board of Fire Underwriters.

* * *

A five-year-old girl saw a small airplane land in her father's peaceful meadow in New Jersey. An alarm was sounded and our fighters took to the air. The craft proved to be a three-and-a-half-pound gas model monoplane with the name "Guess Who" on the fuselage.

* * *

Your correspondent has not found it very difficult to obtain passage on our airlines. With the announcement that most planes had been taken over by the Army, most people felt there would be no space. Here in Washington where it has always been difficult recently to obtain a reservation, things seem about the same. The public just cannot get on without the airlines, possibly we should change the policy and let them have all the planes they want. I have a hunch this will come about within six months. Certain it is that the production of motors would warrant it—the power plants used by the airlines would never be missed. The general good resulting to the war effort would be great.

* * *

Hanson Baldwin writes in a metropolitan daily that the airfields built in Labrador, Greenland and Iceland will permit of the ferrying of short range fighter planes to Europe. I have been keen to tell this myself for some time but feared censorship.

* * *

People who lose their Government aviation jobs should never get mad and take it out on aviation. They should maintain their old crusading spirit, for flying is a matter of destiny. Lord Brabazon, pioneer airman and former Minister of Aircraft Production in Great Britain, has been going back on his old love, aeronautics, and has been attacking the present policies of the RAF and saying that bombing alone will not win the war. It may not—without a few mopping up ground and sea forces—but unless we have enough bombing we may lose it.

* * *

Donald Nelson of the War Production Board is reported down here as ready to set up an air cargo committee to study the possibility of speeding the development of giant freight-carrying planes which can be used to rush critical material to vital points.

* * *

Your correspondent knows of another agency of the Federal Government—and it is not the one you might expect it to be—doing exactly the same thing already. Grover Loening, early engineer for Orville Wright, has been stressing the possibilities of such cargo craft for years and the powers-that-be are only now beginning to comprehend his figures and what he has been preaching all this time.

END

15 YEARS AGO

FROM the August, 1927, issue of this magazine:

"It is not too much to predict that within 20 years the developments will be so great as to make the vast automobile industry look like a minor achievement in wealth and power."—Editorial.

Gliders and motorless planes even then were recognized as an important step in the training of power pilots, a feature on this subject asserting that "pioneer attempts to fly with motored machines were attended with failure because man had not mastered the art of gliding."

Forecast: "The feat performed by Chamberlin and Levine again convinces us that transatlantic flying is getting to the practicable point. Soon there will be big planes with many engines in a regular ocean crossing service."—G. M. Bellanca.

Irony: ". . . the pioneers . . . have opened up the skies to civilization."—Benito Mussolini.

The landing of a Naval plane on the deck of the carrier *Langley* is described as "one of the most difficult aviation feats."

"The future of aviation is in the hands of the youth of this country," declared Daniel Guggenheim in presenting the new $500,000 building of the Guggenheim School of Aeronautics to New York University.

Aerial photography and surveying was beginning to achieve an important place in commercial aviation. The story of its development was told by E. W. Fuller of the Chicago Aerial Survey Company.

CAP Pilots Say, "REARWINS PERFORM BRILLIANTLY"

Day after day, over land and over sea, Rearwins are flying on important Civil Air Patrol assignments. CAP members say, **"REARWINS perform brilliantly.** We want more of them." More of them are ready. Write or wire TODAY for immediate delivery of any model . . . available with 2-way radio and blind flying instruments for CAP duties.

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Free literature on request for 50 to 175 h.p. horizontally opposed or 220 to 300 h.p. radial engines. Write Dept. P82. Specify which literature desired.

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LYCOMING DIVISION, THE AVIATION CORPORATION WILLIAMSPORT, PA.

The day is coming — the day of Victory.

There are encouraging signs—from Midway, from Cologne, from Melbourne—but that's all they are—encouraging. Only now, at last, are we beginning to hold our own. Only by united, concentrated effort can we swing the tide. We cannot afford to lose sight of the fact that America can lose this war—it's up to us, each and every one of us.

HOW CAN I HELP?

Get training, some sort of training so that you can help in the factories, shipyards, during blackouts or in hundreds of other ways. Be a Nurse's Helper, join a Home Guard, State Militia, Civilian Defense, or Red Cross unit. The good American is the trained American!

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Embry-Riddle gives specialist aviation career training — qualifying our graduates to take their Civil Aeronautics Administration examinations for Aircraft and Engine Mechanics licenses, Commercial license, Instructor and Instrument ratings. Air power will be the deciding factor for Victory. While learning at Embry-Riddle you'll enjoy the pleasure of living in Miami — air gateway to Latin America.

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United States State Department — Royal Air Force

Air Power and the Coming Invasion

(*Continued from page 31*)

ern Ireland and England, *and they will land in France.*" General Marshall isn't a careless talker. What he says he means. Furthermore, Lieut. Gen. Brehon Somervell, Chief of the Services of Supply; Rear Adm. Jack Towers, Chief of Naval Aviation; Lieut. Gen. Hap Arnold, Chief of the Army Air Forces; Maj. Gen. Dwight Eisenhower, Operations Chief of the General Staff; and Brig. Gen. William Lee, chief of the parachutists and airborne troops, all are in England having talks with their British opposite numbers. In the last war a gathering of the important brass hats always presaged an offensive, and the same undoubtedly holds true today. The Americans got to France once before and they're going to get there again. The only questions are when and where they will land.

As to when, too many unknown factors enter into the picture to permit more than a vague guess. My own vague guess, founded on no facts but on a lot of hope, is any time between August 1 and Sept. 15, when the weather is fine for air operations and the English Channel is smooth enough for small boats to cross.

Factors determining the time are also the shipping situation, the numbers of men and the amounts of material already landed in England and Ireland and on the way; the state of readiness of the British forces available for invasion; and the necessity to insure that the combined British and American air forces can gain and hold absolute mastery of the air. The planning for such an invasion of country held by a strongly armed and determined enemy takes a great deal of time. Every detail must be worked out in advance; nothing must be left to chance. At zero hour the invasion forces must start to move, must mesh into the general plan with the precision of gears in a watch. If any major part fails, all may fail and the invasion machine may be disrupted.

Other factors determining the time may be what I term factors of necessity. That is to say, if the situation on the Russian front deteriorates rapidly, or if the Germans suddenly attack from Crete and the Dodecanese Islands through Turkey, aiming at Syria, Irak, and Persia, it may be deemed necessary to start an immediate invasion of France or of Norway, or both together, in order to draw off German forces from the threatened area.

Let's examine that situation briefly. The Russians tried for three weeks to take Kharkov—and failed. After two German counter-offensives north and south of Kharkov, the Russian offensive stopped. Both sides claimed victory, as usual, with enormous losses inflicted on the enemy. Apparently nothing was gained by either side but casualties. The significant fact is that the Russians took the offensive, but could not maintain it; the Germans started on the defensive and ended still holding firmly to the transportation center of Kharkov. Thus the Germans accomplished their aims, which were purely defensive. But as defensive warfare is not the German summer habit, we must presume that they plan an offensive somewhere, even if last winter's campaign in Russia shook them to the bones—but it shook the Russians, too.

Likely place for the German offensive is toward the oil lands of the Middle East, moving down through Syria and Trans-Jordan into Egypt, to link up with Rommel's forces in Libya, which for a while seemed to have got themselves out on the end of a limb. Other likely spot is the Russian Caucasus oil fields. If either of these attacks eventuate and the Russian or the English positions are seriously endangered, then it may become advisable to throw an Anglo-American invasion force onto the continent of Europe as soon as possible. To this extent it may be said that an indeterminate invasion time factor is the movement of the German army—if it finally does start moving.

There was a peculiar speech made by Hitler last Spring. He was very pessimistic. Dark days were ahead, he told the German people, and they must prepare for another winter of war. As the German people, from all accounts, are not too happy anyhow, it seemed rather odd for Hitler further to depress them. It may well be that this speech was designed primarily for outside propaganda, to lull the British and Americans into a do-nothing policy so far as invasion was concerned. Hitler dreads a second land front; so do the German

We're signing this pledge
By Thousands
TO HELP AMERICA BUILD A PLANE EVERY 8 MINUTES
Pledge of the Aircrafter
To the end that American war plane production may reach the rate of one every eight minutes or a total of 60,000 for 1942—
To the end that there not be "too little, too late" on the battle fronts where our fighting men are offering their lives for the preservation of my country—
I solemnly pledge my full support to the great objectives of the Joint-Labor Management Production Committee of Goodyear Aircraft Corporation.
Robert Moore

FOREWORD: *In April a Joint Labor-Management campaign was launched at Goodyear Aircraft Corporation in cooperation with the War Production Board's drive to attain the President's goal of 60,000 warplanes this year. Its slogan: a plane every 8 minutes will put the Axis behind the 8-ball. The following advertisement, recently published in Akron papers, tells how Goodyear aircrafters responded.*

Things have been happening fast here at Goodyear Aircraft since the big "Plane-Every-Eight-Minutes" rally a few weeks ago.

Telling us how we could help put Adolf, Hirohito and Bennie behind the 8-ball has given us a real mark to shoot at.

Thousands have signed the Aircrafter's Pledge to do their best to help America produce 60,000 warplanes this year—*a plane every 8 minutes.*

HOW GOODYEAR AIRCRAFT CORPORATION SERVES THE AIRPLANE INDUSTRY

1. *By building parts to manufacturers' specifications.*
2. *By designing parts for all types of planes.*
3. *By re-engineering parts for mass production.*
4. *By extending our research facilities to aid the solution of any design or construction problem.*

Every pledge was signed voluntarily, the American way.

Suggestions for bettering our work, eliminating bottlenecks and saving materials are pouring in, too—50, 60, 70 and more every day. Many of them so good, it's going to be mighty hard to pick the Grand Award Winners.

And it's inspiring to see the daily work-progress thermometers many assembly crews have put up on their jigs, to show how far ahead of schedule they are.

You'd get a kick, too, out of the slogans everybody is contributing for the "Nippo-Nazi Say" posters all over the plant. Bull's-eye bell-ringers like "Stay out late with Mama, please Yokohama"—or "Make more scrap, no hurt Jap."

That's the spirit out here at Goodyear Aircraft. We're on the march, making every minute count more in doing our share of the work necessary to deliver a plane every eight minutes — *to make America first in the air.*

For we know that until our airmen rule the skies, neither life, liberty nor pursuit of happiness will be secure in this world again.

We repeat, this is our war, too — and as soldiers of the production line, we're pledging our finest effort to help win it.

Berlin, Rome, Tokyo papers, please copy.

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W. E. Fowler, A. C. Michaels, Co-Chairmen

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ON AMERICA'S FRONT LINE OF ACTION

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Name
Address

people. No matter how much the RAF bombs Cologne or Essen or Hamburg, Hitler doesn't have to move a single German tank or German soldier from the eastern front. At most, he has to keep fighter squadrons and antiaircraft batteries at home. But if France is invaded, he will have to recall many German army divisions, shuttle them across Europe and throw them into a new battle line in France. Having to fight again for what they had won before would be enough to shatter a large percentage of German morale.

It might be inquired why we should accept the risk and face the certainty of losing many thousands of men in a continental invasion when combined British and American air power eventually must batter the Germans to defeat? Air Vice Marshal Harris has said that if he could send a thousand heavy bombers a night over Germany he could end the war by September, and if he could send 20,000 in one night the war would end next day. The answer is that he cannot yet send 1,000 heavy bombers a night every night, even if they would accomplish what he believes they can. And there is no sound reason why a British army of over 2,000,000 men should sit around in England eating its head off when it might be doing something to win the war, instead of just watching the planes go by. And as we are sending a large expeditionary force to Ireland and to England, it doesn't seem that they are needed to defend England, so they must be headed for some other destination. And finally, it simply is not in the fighting nature of army generals to let an army sit on its tail while an air force wins the war. That indignity could not be born with equanimity. Adding up all these factors they come to: an invasion of the continent of Europe by British and American armies.

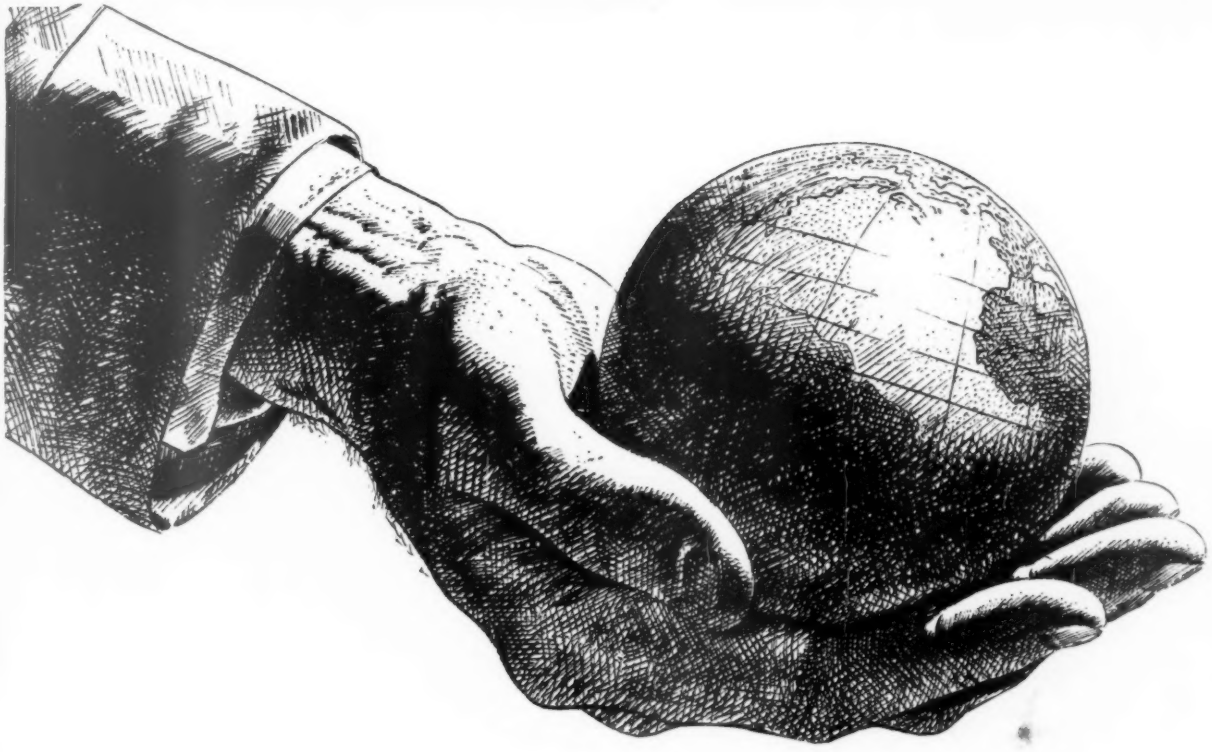
As to the method—and again I'm guessing. Spearhead of the attack must be the Royal Air Force and all we can get into action of the U. S. Army Air Forces. We must gain absolute mastery of the air, and keep it. That will not be a difficult task to accomplish, for probably three quarters of the Luftwaffe already is tied up on the Russian front or in Libya, or is being held in readiness for the offensive that Germany must wage this year: against Russia, the Middle East or a new Russian theater in the Caucasus oil lands. Even if any considerable part of these air forces are shuttled across Europe to fight off the invasion, there is no doubt whatever that we and the British have superiority in the air. We also have air crews that fight with more determination and with a greater faith in eventual victory. This past winter in Russia has done things to the German air force as it has to the German army. The old myth of invincibility has been shattered; the easy march to victory has been stopped. The Germans have entered a period of questioning and doubt of many things.

As to the place for invasion. It probably will be made in many places, from the coast of Norway to the entire coast of France to force the Germans to divert their defending forces and spread them out. With their armies now spread all over Europe, they cannot be strong everywhere. They are bound to be weak at many points. These points the invaders will try to determine and strike at. If they gain footholds in Norway, 400 miles from England, the problem of holding and supplying those forces will be enormous. But the German problem of sending reinforcements to the northern part of Norway will be as difficult. It seems a reasonable guess that at least the northern part of Norway, which the Germans are using as a base to harass our convoys to Russia, is an invasion objective.

However, there is just one area where a really large-scale invasion has the best chance of succeeding: along the French channel coast, where Napoleon stood more than a century ago and gazed across at the cliffs of Dover, where Hitler stood in 1940, promising the British that he was coming. British sea power forced Napoleon to turn away without making the attempt—and British air power alone, and the threat of British sea power that didn't have to be used, caused Hitler to turn away and, a year later, undertake his Napoleonic campaign into Russia, which ended in near disaster, as he has himself admitted.

I remarked last month that the course of a war resembles that of a river, always seeking naturally the paths of least resistance. In an attack on the French or Belgian channel coasts, it may be expected that the German resistance will be the strongest. Yet, *once that initial resistance has been overcome*, the short stretch of sea between England and the continent offers the easiest and most natural path for invasion. There, across a channel only 22 miles wide at its narrowest, and no more than 100 miles anywhere, the British and ourselves can shuttle boats of all sizes, day and night, under a protective curtain of air power. In that small area the Allied air forces can keep the sky clear of German bombers and fighters. It can be Dunkirk played in reverse, this time with an overwhelming air superiority. Even at Dunkirk in the dark days of 1940 when the RAF was outnumbered, it yet managed to gain what amounted to virtual air mastery in a limited area. There, for the first time, the Stukas got stuck, and the Me-109's couldn't do very much about it. German fighters and bombers will do even less this time, in proportion to the losses inflicted upon them. However, unless the Germans are holding thousands of planes in reserve for this expected invasion, the issue will not long remain in doubt. Incidentally, there has been less German fighter interference with British night raids than the British expected. So it is possible that the Germans are holding back, as the British held back their planes in the Battle of Britain, stolidly accepting bombardment, but refusing to expend all their fighter forces. In the opening phase of the invasion there probably will be a series of the greatest air battles yet fought. The British and the Americans will win them.

Parachute troops and air borne infantry undoubtedly will form the next phase of the attack, accompanied by intensive and continuous air bombardment of German positions. But the channel coasts of France and Belgium will not be another Crete; the Germans will have strong



In his hand!

THE Air Forces of the United Nations form the spearhead directed against the forces of havoc at loose upon the globe. The world is now and will always be in their debt. And this is not only for what they do today. It is also because what they do is the thing around which the future welfare of mankind is being built—the final conquest of the ocean of the air. For the warplanes which go forth to do battle today are the nuclei of the transport fleets of tomorrow.

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forces on the ground. Therefore, a concurrent invasion by sea is indicated: an invasion following some such pattern as that used successfully by the Japanese in the Philippines and elsewhere. A reasonable expectation is that continuous waves of British and American fighters and bombers will engage the defending air force and at the same time attack German ground positions. An air force is war's most adaptable weapon: it can at the same time engage an enemy air force and also act as long-range artillery to blast ground defenses for the sea and land invasion forces. After the initial landing is made, the air force will advance its bombardment objectives in much the same manner as artillery in the last war moved from bombardment of enemy trenches to bombardment of support trenches and back areas. The chief difference will be that the air artillery can be lifted to smash all back areas, all supply depots, and all lines of communication far in the rear. It is, in a sense, artillery with wings and long range. This is merely the logical utilization of air power used in support of ground forces. It can be effected as well by an independent air force such as the RAF as it can be effected by an air force that bears the name of the United States Army. The only requirement is the realization of the need for the proper coordination of land and air forces to achieve a desired objective.

It may seem to many that the above speculations unduly simplify the problem by placing the attack along the channel coasts. It seems so obvious that the Germans have to know it. Well, it is obvious, so we may expect it to be confused by other attacks in many places. But when the British and the Americans get down to business, when they've made attacks on Norway and the southern coasts of France, and in Holland and elsewhere, the main traffic artery at last will settle down to that bit of channel separating England and France. Simply because it's the shortest distance between two points, because it requires less shipping, less time in transit—and hence in danger by sea—and because over the narrow channel area it will be possible at all times to concentrate an overwhelming force of Anglo-American air power, which, when all is said and done, is the key to victory in the entire invasion set-up.

Will it succeed? If attempted with sufficient force, and in time, it cannot fail. Surely we've had enough of too little and too late, everywhere. Too late may be if we wait and risk the defeat of Russia, if we wait and risk the defeat of the British in the Middle East. Not possible? We've told ourselves that: the Maginot line was impregnable; General Mud would defeat the Germans in Poland; German tanks couldn't get through the Greek mountains; Singapore was impregnable; the Philippines could be defended—General MacArthur said that, a year ago. Airplanes couldn't sink battleships; Hitler would run out of oil; German tanks couldn't cross the canals of Holland or the Albert canal of Belgium. Hitler said he'd

(*Continued on page* 84)

NOCTURNAL PROWL . . . the somber silhouette of a mighty Republic *P-47* THUNDERBOLT in the stratosphere portends sudden disaster for Axis planes caught out in the night air. Republic Aviation Corp., Farmingdale, Long Island, New York.

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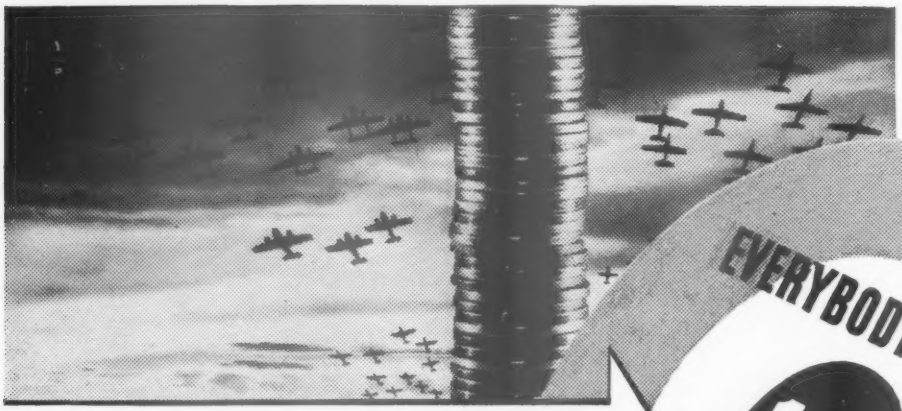

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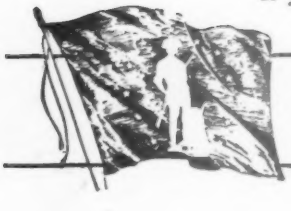


U. S. War Savings Bonds

(This space contributed by the Ziff-Davis Publishing Co.)

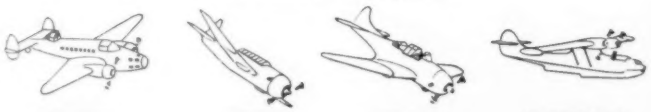
WILL ordinary folks own a family plane? No question about it! You could buy one today but for the war. That's only part of the story. There'll be super-luxury liners for air travel. Fleets of flying freighters! You'll see them all in the new America that is just around the corner.

This will be a land that's even more wonderful than the one we're all fighting for today. Its birth is scheduled for the day after Victory. From blueprints already drawn . . . from factories already producing . . . from the hearts and minds of men already building toward it, will come a way of life to dwarf anything we've ever known.

If you had been as close to aviation as we of B. F. Goodrich have been for three decades, you too would realize that miracles are becoming commonplace. From our own laboratories, we've seen developments which helped to give a new concept to flying. Developments such as the first low-pressure airplane tire, a Silvertown that could take the impact of a plane's landing again and again. The first De-Icer, which makes possible year-round flying. Brakes to bring giants-of-the-air to safe, smooth stops. The list of B. F. Goodrich aviation products numbers 80 now . . . and it's still growing, still improving, still probing the future.

Right now, of course, we have that other job to do. The planes we equip today must destroy before they can create. Uncle Sam's bombers, fighters, and trainers have first call on our Silvertown Tires, Expander Tube Brakes, De-Icers, Bullet Sealing Fuel Cells. But, when that famous birthday arrives, the planes of peace will also be supplied with B. F. Goodrich equipment. The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.

Here are some famous American planes that are supplied with B. F. Goodrich equipment.



LOCKHEED HUDSON — VULTEE VENGEANCE — DOUGLAS DIVE BOMBER — CONSOLIDATED PATROL BOMBER

Skyway or Highway

B.F.Goodrich

FIRST IN RUBBER

(*Continued from page* 80)

be in London by September, 1940; in Moscow a year later. He also told the German people it would be a short war. So much for the value of anybody's thinking about this war!

However, one thing sticks out: caution and the defensive have not won a single victory or won an inch of territory, while boldness and the offensive spirit have won everything, for either side, that has been won so far in this war. Surely that is a lesson we should take to heart. To sit and wait until we have enough of everything to insure victory everywhere, before we attack, is a policy of timidity. We must strike out with what we have, where we may have it, and where we think it will do us the most good. In England right now the British have air power far superior to what the Germans can spare from their other fronts; we are adding to it day after day. The time to strike at Germany by air, sea and land is soon—and the sooner the better.

END

Aircraft Forgings

THE first forging plant in the United States operated by aircraft men exclusively for the aircraft industry has been announced by Proctor W. Nichols, president of Aircraft Mechanics, Inc., Colorado Springs, Col. The company primarily is engaged in airplane parts production with its present output going to airplane manufacturers working on Army and Navy contracts.

AOPA News

(*Continued from page* 44)

erans, and the "toss them in rule" won't work satisfactorily. Are too many of our cadets being "tossed in" to solo flying before they are equipped? Speed to win the war is necessary, the veterans agree, but before our boys are fully trained this practice is merely helping the enemy.

No one outside of the military forces knows whether the trainers—and the combat planes, too—are being poorly serviced. Many of our veteran flyers suspect that much of our military maintenance is not all it should be. Men who know the air game understand that the necessity of long, safe flying is careful maintenance of equipment.

This much is known. The military cannot possibly have enough technicians and skilled mechanics to handle the equipment as it should be handled. They are being trained by the hundreds. At the same time action on the McCarran-Randolph Bill is being delayed in Congress. That proposed enactment enters this discussion because it would empower the CAA to train mechanics under the CPT Act of 1939, under which thousands of young men have been given their first lessons in the flying art.

The Army and Navy at first reported adversely on the McCarran-Randolph Bill. When it was introduced, the intention had been to apply it on a civilian basis as the first CPT courses were given. War threats were prevalent but the nation was at peace. Times changed. The Army and Navy, moving to the forefront in all matters of defense responsibility, were invited to share their views on the McCarran-Randolph Bill.

Pearl Harbor had not been attacked by the Japanese. Veteran commercial aviation operators knew that a Federally-subsidized training for mechanics was just as much a necessity then as training young pilots by the thousands. But the Army and Navy reported adversely on the Bill.

Later, after Pearl Harbor, both branches of our defense reported to the House in favor of the McCarran-Randolph Bill. It was approved unanimously with the two words added, "and technicians." In the meanwhile, the adverse reports still remain on file in the Senate's Commerce Committee, and when consideration of the Bill arose and the Senate asked the Army and Navy to clarify their views as to whether their statements to the House were their correct views or their statements to the Senate, it took days and days for the Army and Navy to amend their stated views as on file with the Senate.

At this writing the McCarran-Randolph Bill stands approved by both the House and the Senate—awaiting action. Meanwhile, airplanes worth millions are crashing and lives—of unaccountable value—are being snuffed out and all because, many pilots firmly believe, equipment is not kept in the best condition and on a military training basis. Some feel that similar conditions may extend to combat bases. Detailed information is, of course, not available on this point.

There is one more point which might be worth considering in regard to the McCarran-Randolph Bill. It was originally designed to provide technical training in the specialty work outside the military sphere. Since that need has doubled and redoubled, the Army and Navy have requested that the amendment be added to the effect that all trainees would go into the armed forces. But Army and Navy both need hundreds of mechanics and specialists building and servicing their planes—and airline planes—away from military posts. The McCarran-Randolph Bill ought to be enacted and put through right away to help eliminate that percentage of military crashes due to faulty aircraft maintenance.

May Change Spin Requirements

The CAB has under consideration a proposed amendment to Part 04 of the CAR which would change the spin requirements and add a new requirement for controllability at the stall for non-transport category airplanes.

The proposed amendment would permit normal use of the controls in effecting *prompt* recovery from a spin, as recommended by the Army-Navy-Civil Committee on Aircraft Design Criteria.

The present regulations specify controls neutral in this maneuver. The amendment would eliminate the present weight classification (that is, above 4,000 pounds) as the criterion for determining what airplanes may be exempted from

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RCA MODEL AVR-100 Receiver—same size, same design as the AVR-101, but covers also the standard broadcast band. Either the AVR-100 or 101 can be equipped with the inexpensive RCA Loop Antenna Model AVA-122 for direction-finding and "homing."

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spin tests. In place of the weight criterion, the proposed amendment would exempt the following classes of airplanes from the spin requirements:

1. Those certificated in the transport category,
2. Those placarded "intentional spinning prohibited," and
3. Those characteristically incapable of spinning.

Since safety depends upon adequate control at the stall, to prevent unintentional spins, as well as upon spin characteristics, the proposed amendment also includes a new section specifying the lateral and directional controllability and the maximum pitch during a stall. This requirement is similar to one already adopted for transport category airplanes.

The CAB asked the AOPA to circulate notice of this proposed change to the Units and individual members for comment as to the desirability or undesirability of adoption. As we go to press, comments from our membership thus far received have been in favor of its adoption.

END

Better Engines Coming

POSSIBILITIES for increased efficiency with our present air-cooled gasoline engines are by no means exhausted, flight tests made over a four-month period by United Air Lines and Standard Oil Company of California indicate. The tests checked engine performance and related data by means of motion pictures of instrument indications.

Japs Are Their Specialty

(*Continued from page 24*)

team mate to provide cover. He got his bomber but a Navy Model 97 fighter shot his tail off. Paul threw back the greenhouse and climbed into the blue at 9,000 feet. He yanked the rip cord on his chute and floated lazily with the Jap machine gunning him all the way. His shroud lines were cut, his parachute looked like a sieve, but Paul didn't have a hole in him. For 8,000 feet he climbed the shroud lines and swung like a monkey to evade the murderous Jap passes.

AVG Flyer Cressman wasn't so lucky. The Japs murdered him in his chute. After that, General Chennault issued new orders and henceforth when a Flying Tiger bailed out he was followed down by his team mate who, by circling the descending chute, saw to it that his buddy was not harmed. Bill McGarry was seen to land this way in enemy territory, gather his chute in his arms and run for the brush. He didn't get back to Allied territory and it can only be assumed that he became a prisoner of war.

One of the questions most frequently asked these returning heroes is their reaction to this murderous Japanese practice of machine-gunning defenseless pilots who had been forced to bail out of their planes.

"Did you men retaliate by shooting parachuting Jap pilots?"

The answer is "No." The AVG flyers seemed to feel that their job was to prevent the planes from reaching their objectives. The destruction of the plane was what counted most. Besides most of the Japs who bailed out near the Chinese and Burmese bases were taken prisoners.

There is a strange psychology about these Tigers. They went to Burma to fight for the Chinese whom they believed to be in the right. But most of the boys will admit it was the $600 per month and $500 per plane bonus they were paid that caused their intense resistance. After Pearl Harbor was bombed it was different. America, their own country, had been attacked. Their own friends and relatives were in danger. On December 8, the AVG fought Japanese over Toungoo with renewed fury. They got 21 planes that day. On December 10, the salary and bonus was withdrawn and the Flying Tigers became merely American pursuit pilots assigned to a deadly serious business. The next day they got every plane of a 12-plane flight.

Strangely enough, the AVG first got word of the Pearl Harbor bombing from the Japanese-controlled radios operating in occupied China. Shanghai broadcast that Pearl Harbor had been attacked but the men were inclined to disbelieve the report. That night the powerful General Electric station, KGEI in San Francisco, confirmed the news. The next morning the Shanghai and Tokyo radios broadcast that San Francisco and Los Angeles had been bombed. Many of the AVG boys who had relatives living in those cities were very disturbed. It was all General Chennault could do to prevent them from flying their few remaining P-40's with murderous intent into Japanese territory.

As has been the history of the war in the air in other zones, by far the greater number of AVG planes were lost through operational accidents and through lack of replacements than through enemy action. When tires wore out or were damaged in combat, for instance, the whole plane became a loss as far as active service was concerned. It had to be pushed off into the trees and used as a salvage ship.

At the time Walter Pentecost left Burma (shortly after the fall of Rangoon) only 13 ships had been lost due to enemy action, yet not one full squadron of P-40's remained. The loss was due to lack of supply and lack of parts replacements.

How are the Japanese ships? Well, we've already written that the Army Model "O" (the AVG boys still haven't learned to call them "Zeros") is more maneuverable and climbs better. We know also that the ships have more horsepower than our P-40's. They aren't as well constructed and they have no defensive armament. The Jap bombers (Mitsubishi 96's and 97's of both Army and Navy design) are faster than the Zeros, but still lack armor plate and bullet-proof tanks. The Jap engines are all air-cooled and are *not*, to the best knowledge, supercharged.

The Japs have one wicked little weapon that the Tigers learned to stay clear of: a tail stinger which the boys called a "dust gun." The Mitsubishi 96's and 97's were originally designed without thought of a tail gun position (you don't need one to bomb defenseless Chinese) with the result that the AVG boys flew right up on the Japs and blew their tails off.

One morning four of the boys sneaked upstairs to intercept a squadron of bombers headed for Toungoo. They came in at 9,000 feet and made the attack in the usual manner. But one of the Tigers noticed a row of holes appear on the front windshield. Luckily, no one was hit and one of the Jap bombers was shot down. Later in the day a searching party brought in the wreckage and the men found an ingenious rear gun mounting which sprayed bullets in a 30° arc. The gun, mounted in a space too small to accommodate a man, was fired by remote control by the top turret gunner who was in a position to see the attack.

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Several of the AVG boys have said that the Japs apparently are not instrument men. Even when closely pursued they have been known to fly *around* clouds instead of through them. The shot-down Jap bombers prove to be full of blind flying instruments and whether the Japanese pilots lack instrument training or hesitate to trust their instruments, the Americans don't know.

Larry Moore, who went through some of the heaviest raids on the air field at Kunming, says that one squadron of Japs would bomb with unerring accuracy while the next day another squadron, under the same conditions, would miss their objective entirely. These were the ones Larry said you had to be careful of if you were caught on the ground. As soon as the Chinese cry of "Jin Bao!" would be heard, the ground forces would rush away from military objectives and throw themselves into specially prepared slit trenches. The bombs that missed the air field often fell too close to these shelter trenches for comfort.

Larry tells of being caught on the ground in that first raid on Kunming by unescorted Jap Army 97 bombers. The Kunming communications had not been thoroughly tested, with the result that Larry only had time to pull on his shoes and dash across the Burma Road into some holes on the side of a nearby hill which had been constructed, he thought, as raid shelters.

After the first run across the target which resulted in no little damage, Larry was hauled out of his place of hiding by a fellow employee.

"You're lucky those boys were good shots," he was told, "they usually miss the target completely and plaster this hillside. These holes aren't raid shelters, they're bomb craters."

Where do the Flying Tigers come from? About 75 per cent came direct from fighter squadrons of the U. S. Navy. These men had all had at least five years of standard Navy training and are, for the most part, graduates of Pensacola. About 10 per cent came from the Marine Corps and the other 15 per cent from the U. S. Army Air Forces. It is untrue that any of them were released convicts or renegade commercial flyers, as has often been reported.

They are nearly all, with few exceptions, between 25 and 29 years old and are cool-headed, crafty and determined. They had been well trained and found it easy to adapt themselves to actual fighting. The stories of single-handed missions and slashing, twisting, upside-down attacks are not true. An AVG flyer wouldn't have lasted three minutes in that kind of combat.

General Chennault gave them their plans for attack and insisted that they stick to the plan. They were assigned a certain radius of action and a certain method of attack, and while these plans varied from time to time, it was always by General Chennault's order. The AVG flew like a perfectly co-ordinated football team. Every man knew what every other man was going to do and acted accordingly. It was the serious, calm and deliberate thinking and planning on the ground that lead to subsequent victory in the air.

Walter Pentecost reports that, oddly enough, the U. S. Navy flyers came off with a greater percentage of victories—and, while it may have been due to several unaccountable factors, it may also be the result of a better peacetime discipline and training.

From 300 carefully distributed questionnaires to ordinary followers of the war, the three questions asked most frequently were:

"How do the American planes stack up alongside the Japanese?"

"Are the Japs good flyers?"

"How did the AVG feel about America's entry into the war."

"When the tide rises they'll take off. Until then it's a military secret . . ."

These questions I have tried to answer already. Here are some others that provoke interesting observations.

"Did the AVG have any Lockheed P-38's?"

No. Only P-40's found their way to the AVG. I saw a photograph of a Stinson "105" which was used for liaison travel, and a Lockheed "12". The "12", I was told, was the very first one made and had a colorful history. It flew Chiang Kai-shek all over China and made 20 dangerous trips back and forth across the Burma Road before the protecting P-40's were brought in.

"Do the Japs really use suicide tactics?"

The answer to this question is, "Yes, if they believe such tactics will secure a victory." Flaming Japs have been known to dive their airplanes into ground objectives. These tactics, while requiring special measures to meet, do not give the Japs an advantage.

"What was the AVG's greatest problem?"

Supply and replacements.

"Does General Chennault ever fly in combat?"

No. He's one of America's ablest combat flyers, but realizes that his place is on the ground.

Does the AVG have a battle cry like the British "Tally Ho?"

No. During combat the American radio is full of burning American invectives but no standard attack phrase was ever used, Time Magazine notwithstanding. (Time reported that the Tigers peeled off with the words "Certified Check!" as they spotted the enemy.)

"What about repairs in the Burma jungles?"

Walter Pentecost showed me pictures that were hard to believe. One P-40, with a cannon hole in the rudder you could stick your head through, had been repaired with yards and yards of surgical tape. The tape stayed on through numerous combats and was still in service when the plane was finally pushed into the trees and stripped. Machine gun holes in propeller blades merely had the burrs scraped off of them, and were not filled in. Yet no ship was sent aloft, I was assured, that was not in a position to take care of itself.

The Chinese have a marvelous filter system in operation for reporting enemy aircraft and very seldom was the AVG caught napping. Again because of the Japs' apparent desire not to indulge in instrument flying, the Americans seldom had their sleep disturbed at night or were called out on days when the weather was bad.

Many of the veterans of America's first war with Japan have returned to this country under orders. They are at present working where it will do our country the most good: in aircraft plants telling designers what they need most, at material centers conducting tests and on training fields teaching teachers in the fine art of "blowing the Japs to hell." To that end let us hope they are successful and that, when the war is over, America will hold a special place in her heart for the "wildmen of Burma," who gave the Japs their first taste of Yankee fighting: the Flying Tigers.

END

Draft Deferment

YOUTHS in training at Government-approved and industry-recognized aviation schools will be given draft deferment. Students must report to their respective draft boards every six months and show evidence that they actually are participating in the training courses.

All regular departments featured in FLYING will be eliminated from the September issue, which is to be devoted to the story of the RAF. They will appear as usual in the October issue.

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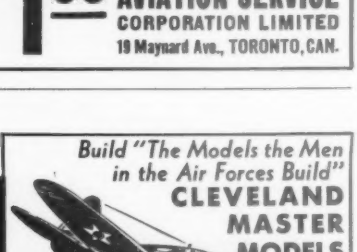

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'Flight Strips'

(*Continued from page 26*)

used for the purpose.

An initial appropriation of $10,000,000 was authorized and, on December 17, the President signed an appropriation making $5,000,000 of this available. These funds may be used without regard to apportioning among the states, and shall be in addition to those available from any other source. Recently estimates for additional funds were being drawn up by the Public Roads Administration and the Army Air Forces.

It will be seen that several Government agencies are involved in selecting the sites and building flight strips. The Civil Aeronautics Administration is involved in an advisory capacity. The actual job of construction, however, is vested in the Public Roads Administration under a plan which constitutes an obvious departure from methods formerly used in constructing landing areas.

It is a workable and efficient plan. The roads administration is a nation-wide organization of sound and competent men, experienced in a type of construction similar to that required for landing areas. They enjoy the cooperation of the state highway departments and are being provided with all the technical assistance the AAF can give them. They have demonstrated already an eagerness to do their job quickly and well. The effect of this arrangement is to bring directly into an urgent phase of the war effort trained men and equipment released from peacetime road building activities.

The program might have gone ahead faster but for the fact that Congressional sanction antedated Pearl Harbor by less than three weeks and that the AAF and all agencies of Government were immediately put under extreme pressure by the plunge into war. As it was, general plans were formulated at a conference on January 9, 1942, which included Federal roads and AAF officials and Hon. G. Donald Kennedy, president of the American Association of State Highway officials.

Two weeks later, instructions went out from the commanding general of the former Air Force Combat Command to the commanders of each of the four Army Air Forces in the United States regarding the location and development of flight strips. The commanders were advised that four initial allotments of $2,000,000 each were being made to the public roads district engineers within each of the four Air Force areas, and that the flight strips would be located and built with the concurrence and approval of the respective Air Forces.

The Air Force commanders and their engineers were given the task of coordinating the work so as to prevent duplication of effort. Existing facilities have been taken into consideration and new sites are selected only when and if existing sites will not completely care for the technical missions required.

In general, flight strips will be located within a radius of from five to 50 miles from air bases and will serve as auxiliaries to those bases. As is natural in wartime, military considerations take precedence over all others.

The number of flight strips needed for military purposes depends of course on the type of planes and the kind of terrain in which the Air Force will operate, as well as upon the nature of the anticipated attack and the location of theaters of operation. In general terms, however, it will be advisable to have one flight strip for each squadron of from 12 to 25 planes. For every three squadrons an extra flight strip is desirable.

The procedure is for the Air Force commanders and their staffs to determine what areas are to be served, how many flight strips are to be built, and for what purpose they will be used.

The district engineer of the Public Works Administration has a representative with each state highway department. The state agency submits proposed sites and the Air Force makes its selections from these. Next the Federal public roads district engineer sends in the projects to the authorities in Washington with the Air Force commander's approval. If no alterations are made, work is started in accord with standard specifications, under a contract with a private contractor.

It can be disclosed that the war's requirements have brought an upward revision of minimum specifications so that the flight strips will be capable of being used by the heaviest bombers now in use and in immediate prospect. A result has been to multiply the original cost calculations about sixfold.

A year ago when an initial appropriation of $20,000,000 was being sought from Congress, it was estimated this would provide for 400 flight strips at an average cost of $50,000 for the small fighter aircraft. The latest estimate now is about $300,000 each for the largest bombardment aircraft, fully loaded for an overseas hop. Naturally the change has altered the original tentative idea of locating at the outset 150 flight strips in the First Air Force area, which includes the populous Northeast; 100 in the Second Air Force area in the Northwest; and 75 each in the Third and Fourth areas.

Specifications have been redrafted in a number of particulars. Originally the probable maximum loadings for military airplanes were estimated on the basis of a gross weight of 80 tons for the entire airplane, which would mean 40 tons distributed on each of two wheels. The distance from center to center for the tires was stated as an average of 30 feet.

In February the writer advised the Association of Highway officials at Philadelphia that the best recognized authorities believed the new heavy bombardment designs up to and including the spring of 1944 would call for gross loads of 120,000 pounds. The design factors listed then would allow from one to three landings per day, if necessary, of the Army Air Forces standard heavy bombardment airplanes (B-17E or B-24).

Under the latest revised specifications, the desirable size overall of the land for a flight strip for military purposes is 8,000 feet in length with a 500 feet safety clearance on each side of the center line of the

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runway. Extra land may be acquired adjacent to the highway for parking or other facilities.

The runway, if any, on a flight strip area for military purposes is not less than 150 feet wide and not less than 4,000 feet long, when paved, with a 1,000 foot extension at each end with stabilized material.

Two runways are not developed on a flight strip area. Should it be desirable to land and take off in four directions in a specific location then an airport or air base should be built, or another flight strip built in that location. An airplane may be towed on the highways or taxiways for a considerable distance between flight strip areas.

The above lengths specified are for sea level and are subject to correction to provide an increase in length of 500 feet for each 1,000 feet of elevation above sea level.

There must be an approach area extending in cone shape from the ends of the runway center, protected from encroachment by high buildings or other obstructions and permitting an approach for military airplanes of 40 feet horizontal to one foot vertical.

Stabilized shoulders at the sides of the runway should be 150 feet wide and 6,000 feet long with adequate bearing characteristics for the gross load of an entire airplane of 25,000 pounds. The general terrain may be uneven but the runway itself must be smooth with not over a 1½ per cent grade for the entire area used.

Probable loadings for military airplanes are calculated: One wheel 25,000 pounds maximum, 12,500 pounds minimum; gross, entire airplane, 50,000 pounds maximum, 25,000 pounds minimum; maximum tire 108 square inches; distance center to center of tires 30 feet; tire inflation pressure 67½ pounds on dual wheels; impact factor 25 per cent.

Landing air speeds are calculated at from 75 to 130 m.p.h., and take-off ground speeds at from 65 to 100 m.p.h.

In general, the runway should be in the direction of the prevailing wind, when possible. Communication lines or utility poles on the highway right-of-way, at the end of a runway, should be placed underground. Other communication lines or utility poles should be placed on the highway right-of-way farthest from the flight strip area.

Much of this progress report has perforce dealt in some detail with technicalities and it may be that the forest has been somewhat lost in the trees. What of the use of flight strips and their promise for the immediate and more distant future?

From the military standpoint, effective air defense of the United States demands that the flight strips program be carried out on a nation-wide basis. Just as there must be organization in depth to train pilots successfully, to build aircraft, or to conduct a successful ground attack, so there must be organization in depth for the landing, take-off and servicing of aircraft.

We must provide a network of landing areas strategically located in all parts of the country. We must provide interceptor facilities all along our coasts. We must provide dispersal points for aircraft, to alleviate the crowding of our main bases and lessen the risk of bombing losses caused by excessive concentration of planes. And we must provide landing areas to care for the vast increase in military air traffic which is taking place. Another aspect is the new stress on gliders, which need long runways to take-off, regardless of their ability to make spot landings.

The need of the AAF for flight strips is not theoretical but proven by recent experience. Col. Floyd Evans, formerly president of the airport division of the American Road Builders Association, and recently air officer with the headquarters of the Fifth Army Corps, witnessed a demonstration of the need during last fall's field maneuvers in the south. He wrote that hastily constructed emergency fields were used with some success for liaison and scouting work, but stated that last-minute construction often resulted in dangerous delays.

"The cavalry and armored organizations," he pointed out, "insist on planes that move with them, and there must be planes to land close to the highways."

For the future of civil aviation the utility of flight strips is no less important. The motor car did not become such a vital part of American life until a system of roads was built for speed and safety, and landing facilities are an essential of the highways of the air.

The United States now has some 2,600 accepted airports and the CAA has funds in sight for increasing the size of those needed for military purposes, but these only begin to meet American aviation's future requirements. Flight strips are the sound and logical answer to the need. Landing areas are the orphan children of the aviation industry and Congress has recognized that like most orphans they need public support until they can stand on their own merits.

Flight strips will provide landing facilities for commercial feeder lines connecting points not now served by airlines, and safe refuge for planes of all types forced down by weather or mechanical difficulties. Their long runways permitting take-off by the heaviest planes will be of inestimable value in the development of air cargo transportation which now is beginning to be emphasized. They will in addition provide the ground facilities which will be essential for the tremendous increase in private flying upon which our expanded aircraft industry will inevitably depend for its existence after the war.

END

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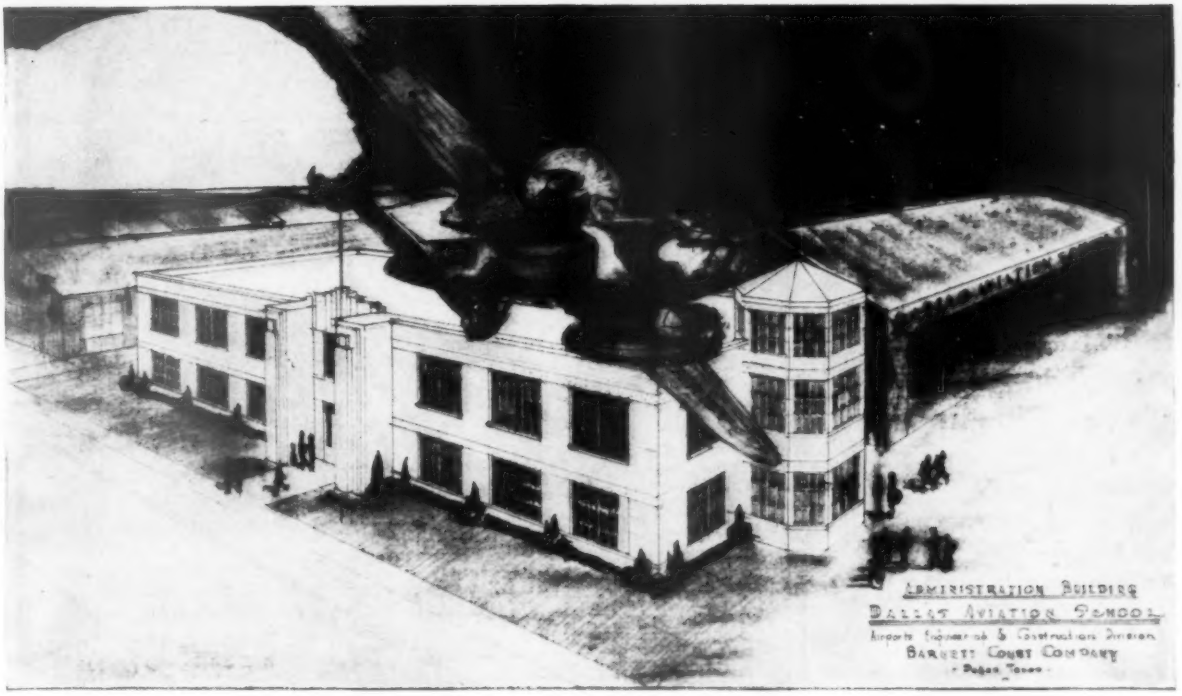
	June 1	
	1942	1941
Pilot certificates of competency	104,793	86,597
Airline transport certificates of competency	1,614	1,496
Student pilot certificates	112,238	92,667
Glider pilot certificates of competency	157	143
Student glider pilot certificates	559	605
Mechanic certificates of competency	15,874	12,258
Parachute rigger certificates of competency	716	480
Certificated aircraft	21,780	21,560
Certificated gliders	64	48
Ground instructors' certificates of competency	6,253	3,395
Air-traffic control-tower operators' certificates of competency	900	347
Air carrier dispatchers' certificates of competency	462	387



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(Continued from page 41)

training program of the armed services? Here are some tentative answers which we agreed upon:

1. The schools could acquaint older boys in and out of school of the nation's need for men to service in the Air Forces; of the standards for selection of men to undergo training as aviation cadets.

2. The schools could have physicians examine prospective air cadets to advise them and their parents whether or not they might hope to meet the physical standards required.

3. The schools could help these boys to secure remedial physical and dental treatment to remove minor disqualifying disabilities.

4. The schools could organize special pre-flight refresher courses for these boys in the physics and mathematics applicable to the work of flyers.

Because of the limited time available, it was agreed that for the spring semester these courses might have to be handled as extra subjects in the boys' schedules, or taught before and after regular school hours.

This summer intensive refresher and pre-flight training courses might be given in the summer schools of the larger communities and boys from nearby communities permitted to attend tuition-free, it was decided.

Next September a full semester's work in aeronautics should be offered in every high school in which as many as fifteen physically qualified air cadets can be enrolled. Boys who have taken such courses will, upon their induction into flight training, be enabled to devote more time to actual flying. Fewer boys will be "washed out" in the ground school phases of their first three months' training period.

All these efforts are keyed to the war. The schools can not overlook the fact nevertheless that the impetus of war needs will also help to usher in a more comprehensive program of aviation education, long overdue in American schools. Civilian aviation is blood brother to military education. It is bound to receive a big boost from the war.

Today this nation flies more airline miles than any other. The thousands of big fast bombers now being built can be converted after the war, if no longer needed for military purposes, to civilian use. The thousands of young men now flying or preparing to fly Army and Navy planes will be added to the thousands of youth who have already learned to fly under the civilian pilot training program of the CAA.

Moreover, after the war a giant aircraft industry will have the capacity to turn out millions of inexpensive planes for private ownership and civilian flying. Will anyone who has experienced the thrill of flying ever want to abandon it?

Therefore, both for this emergency and looking forward also to that post-war period when we have become a nation on wings, the U.S. Office of Education, in addition to its direct cooperative planning with the Army and Navy, has joined hands with the CAA in setting up a joint National Advisory Committee on Aviation Education. Its purposes are:

1. To serve as a general clearing house in which the related objectives and problems of aviation education of the CAA, the Army, the Navy, and the Office of Education may be discussed; duplication of purposes and operating procedures eliminated; and mutual cooperation assured.

2. To stimulate a general recognition of the need for providing aviation education for American youth; and to secure its rapid and sound development in the schools of the nation.

3. To formulate and announce sound general objectives for aviation education; and to review and advise concerning plans and proposals for programs of instruction and of promotion in aviation education.

Ex-officio members of the committee are Artemus L. Gates, Assistant Secretary of the Navy for Air; Robert A. Lovett, War Department Assistant Secretary for Air; Robert H. Hinckley, Assistant Secretary of Commerce for Air; and the writer, as United States Commissioner of Education.

The personnel of the executive committee is as follows: Mr. Hinckley; the writer; representatives of Army and Navy air arms; Ben D. Wood, director of the Bureau of Collegiate Educational Research, Columbia University, and chairman of the national joint committee; Gill Robb Wilson, president of the National Aeronautic Association; Chester W. Holmes, Assistant Superintendent of Schools, Washington, D. C.; N. L. Engelhardt, associate director of the Division of Field Studies, Institute of Educational Research, Columbia University; Carl A. Jessen, Senior Specialist Secondary Education, U. S. Office of Education; T. G. Pullen, Jr., Maryland State Superintendent of Public Instruction; and Bruce Uthus, assistant to Mr. Hinckley. Outstanding educators and airmen were invited to become members of the national joint advisory committee.

The CAA and the Office of Education plan to stimulate and assist textbook publishers to publish textual materials designed for use in teaching courses in aviation in the schools. We shall urge publishers of certain magazines, especially those published primarily for use of secondary school students, to develop ways in which such periodicals may present articles of interest to young people in connection with aviation.

It is expected that the committee will recommend to the CAA and the U. S. Office of Education plans for essential studies of specific problems of aviation education; outlines of specific vocational courses which should be available to students in high schools; plans for the preparation of manuals to be published and distributed by the Office of Education, designed to show the ways in which the study of aviation may be integrated with the various subject matter fields of different levels of elementary and secondary education.

For example, geography classes can study the factors which govern weather

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and climate in various parts of the world, discuss relative mileages of land and air travel, and trace through many lands the course of famous flights, such as Howard Hughes' four-day 'round-the-world journey.

Mathematics classes can learn the elements of navigation, how to compute horsepower of airplane engines from the cylinder bore and stroke and revolutions per minute, and learn to work out lift and drag ratios.

Physics offers a rich source of aviation knowledge—laws of flow, air pressures, forces of wing lift and propeller thrust, magnetism, and the construction and use of instruments.

Even history classes can learn about aviation, by going back into the 15th century to Leonardo da Vinci, who first set down the laws of aerodynamics, and progress through the centuries through the evolution of lighter-than-air craft to the Wright brothers and up to present-day aviation.

Then there are the possibilities for integration of aviation education with the industrial arts courses and the extra-curricular programs of the secondary schools.

It has been recognized from the start that teacher training is essential. Teachers throughout the country want to equip themselves to weave aviation materials into existing studies, and others wish to teach courses in aeronautics. Leading educational institutions expressed desire to contribute to the war effort by preparing teachers in the summer session.

One task of the U. S. Office of Education is to help the teachers' colleges and universities serving the education field to prepare teachers who will be called on to teach aviation courses to high school seniors; and to plan instruction courses modernized to reflect air age needs.

Typical of the interest of leading institutions to assist teachers and school administrators was the emergency program at Harvard University for the months of April and May. Under the leadership of Acting Dean Henry W. Holmes, the Graduate School of Education announced in March that it would give the following courses: Flight and the air in the work of schools, April 6-May 25; Pre-flight school training, materials and methods, April 11-May 23; and the organization of school work in aviation; the training of teachers, problems of administration, May 22-23.

A genuine impetus to youth air training was given by the Navy's request in January to the Office of Education that young people in schools build 500,000 scale models of combat airplanes to help train Navy and Army personnel in identification of the planes they will see while on duty throughout the world.

There is some experience to indicate that the elementary principles of flying are best and quickest taught by the building of models which will actually fly and which are designed according to aerodynamic principles. Enthusiastic response of more than 500,000 students in 8,000 schools to the call of the Navy to build these scale model planes indicates the possibilities of the contribution of industrial arts to aviation education.

In summary, the immediate wartime target of the high schools must be to provide pre-flight and refresher courses in the science and mathematics of aviation for as many qualified boys as can be enrolled; and their objective for the longer future must be to make a functioning program of aviation education an integral part of the curriculum of every secondary school.

Education must be air-conditioned in order that youth may be preconditioned for life in the kind of world in which they will live.

END

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P. A. AUGUST, 1942

Air Training Conference

(*Continued from page 21*)

Board. Its functions will include: exchange of information on air training, advice on standardization of training and advice on steps to secure the most effective use of air training facilities. It will be in a position to detect and correct such wasteful conditions, as a half-idle training school in Canada and a bunch of trainees waiting admission to crowded schools south of the border, should they occur.

The conference actually grew out of a certain degree of bewilderment on the part of the Canadian government about what it was to do with the chain of air training schools built up in accordance with the British Commonwealth Air Training Plan. In 1939, Canada agreed to train an agreed number of air crew personnel on behalf of itself, Great Britain, Australia and New Zealand. The three-year agreement under which the plan operates is due for revision and expires next March. The plan is producing 25 per cent more than the agreed number of air crew. Its output is crowding if not exceeding the number of aircraft being delivered to the forces. Owing to the smallness of the Canadian population, the government foresees the time when its reserves of youth physically and mentally fit for air crew duties may run short.

A general review of the whole air crew situation was indicated and it was arranged to take place immediately before the four countries participating in the British Commonwealth Air Training Plan met to revise and extend their agreement. After the United Nations conference ended these four proceeded to deal with the plan in the light of the information exchanged and decisions reached by the larger assembly.

The American delegation consisted of the following from the War Department: Robert A. Lovett, Assistant Secretary of War for Air; Maj. Gen. Barton K. Yount, commanding general of the Flying Training Command; Brig. Gen. William O. Ryan, Army Air Force representative on organizational training unit matters; Col. Robert W. Douglas, Jr., air member, permanent joint board on defense; Col. G. L. Davasher, Air Forces Technical Training Command; Col. John S. Gullet, military attaché at Ottawa; Col. R. E. Nugent, personnel section, War Department general staff; Lieut. Col. T. S. Power, Flying Training Command; Lieut. Col. O. S. Picher, allocations section of the Army Air Forces; Maj. Joseph S. Edgerton, public relations.

The following were from the Navy department: Artemus L. Gates, Assistant Secretary for Air; Capt. O. P. Hardison, Naval aide to Mr. Gates; Capt. A. W. Radford, director of training, Bureau of Aeronautics; Comm. F. T. Ward, officer in charge, flight training, Bureau of Aeronautics: Lieut. Comm. G. W. Anderson, plans division, Bureau of Aeronautics; Lieut. Comm. T. O. Dahl, personnel division, Bureau of Aeronautics; Capt. R. L. Kline, USMC.

By national interests the conference fell into three divisions, the United States-British Commonwealth Air Training Plan group (Canada, Great Britain, New Zealand and Australia); nations carrying on smaller scale training operations in North America: China, Norway and the Netherlands; nations whose training is carried on in Africa and England: Poland, Czechoslovakia, Yugoslavia, Belgium, South Africa, Greece and Free France (represented by an observer).

The conference brought to light the fact that of all the enemy-occupied countries Poland has the largest air force still fighting, based in England and in the middle east. The man largely responsible for it, Group Capt. Stefan Sznuk was at the conference. He got most of his flying personnel out of Poland when the Germans overran the country, got them into action in France and later in the Battle of Britain had the satisfaction of seeing one of his squadrons shoot down 165 enemy planes in six weeks.

"That settles it! That's the last time we'll show a movie actress through the plant!"

Sznuk made a hit when, at the formal opening session, he apologized for his English and added: "The only time a Polish flyer makes himself understood in English is when he speaks with the 12 machine guns of an English fighter plane."

The main worry of the Poles as well as of the airmen of other occupied countries is to get enough recruits from their own nationality to keep their present air forces up to strength.

The problem of the Chinese air force is planes. The chief Chinese delegate, Maj. Gen. T. H. Shen, reported he has trained pilots idle in China because of lack of planes and if planes were available the Chinese could bomb Tokyo regularly and interfere with Japanese lines of communication. The Chinese lack both training and combat planes. Because of lack of the former they are training men in the United States, but find difficulty in getting them over here.

General Shen was one of the more colorful personalities of the conference and radiated unbounded confidence despite his hard-luck stories of China's lack of planes, lack of heavy guns and lack of transport.

"Sure. Why Not? We have been fighting for five years," was his answer when asked if China could keep on fighting if her supply routes were cut.

Elaborate precautions were taken to guard the secrecy of the conference deliberations. They took place in a building wholly at the disposal of the conference to which only delegates and staff were admitted. The staff was provided by the Royal Canadian Air Force and consisted entirely of uniformed people, airwomen doing the stenography and airmen the messenger work. The only public utterances were speeches of welcome and replies at a public opening session in the Canadian senate chamber and bald daily communiques from Maj. C. G. Power, Canadian air minister, who acted as chairman.

The gist of the official summary released at the end follows:

"As flying training is the foundation of flying efficiency, there is no doubt that the discussions of the conference will soon produce beneficial results on the air operations of the United Nations.

"One result will be the closer approach to standardization of air training methods than was previously possible. These, in turn, will make easier and more effective the co-ordination of the air activities of the United Nations.

"A careful survey of the air crew resources of the various countries represented at the conference was made in respect to the United States and the nations of the British Commonwealth. The result was encouraging. It was recognized, however, that the air crew situation of the countries temporarily occupied by the enemy presented a special problem."

The one notable absentee among the United Nations was Russia, invited but not present—due, undoubtedly, to the concentration of its air forces and leaders on the problems attending the Russian repulse of the German spring offensive. The chief British delegate, Capt. Harold Balfour, Parliamentary under-secretary for air, however, was prepared to report to the conference all the information available on Russia's actual and potential air strength as he spent a good deal of time in Moscow last year with a British mission.

END

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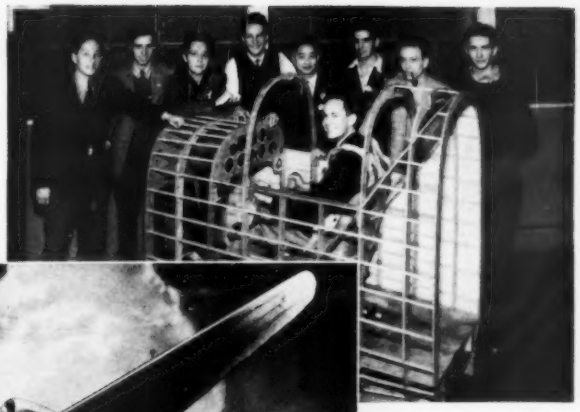

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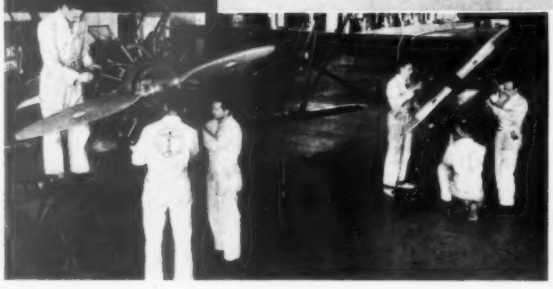

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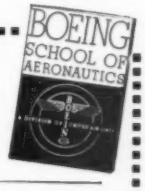

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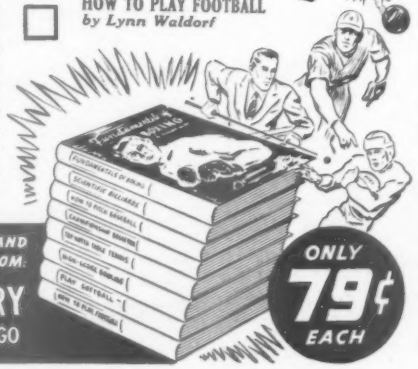

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Fighting Incendiary

(*Continued from page 44*)

"Then it seemed that the secret of combating the fire might lie in conducting the heat into other metals in powder and granule form. This, however, was found to be a means of confining the fire to its seat of origin, but did not extinguish it.

"By the end of February I believed I had the answer. Diatrometrus earth mixed with cylinder oil seemed to work reasonably well as an extinguishing agent. We held a demonstration, but as luck would have it there was a strong rain just before the visitors arrived to witness it. Naturally, the magnesium burned intensely, as the moisture from the wet ground added oxygen.

"The demonstration was a fizzle.

"Still confident that I was on the right track, but not quite clicking, I enlisted the aid of Chiefs Gottschalk and O'Connor. Together, with the permission of the management, we worked out our method of combining viscous liquids and carbon dioxide. On contact with magnesium, the combination extinguishes the fire instantly."

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Just what is the incendiary bomb? As we've pointed out, it weighs about two pounds. It is about two inches in diameter and 18 inches long with vanes incorporated to guide its flight to its objective, although the smallness of the vanes makes it a bit erratic. This erraticism doesn't matter much, however, when thousands are coming tumbling down on an aircraft factory which covers acres.

It must be recalled that these little devils started all of the major fires of London and were responsible for the major holocaust in the heart of the city—a fire which burned for many days and did millions of dollars in damage as well as destroyed some of the most famous of historical places. The English, after that, awakened to their danger and began educating the populace with pamphlets, motion pictures, still pictures and anything else handy to avoid a recurrence.

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don't need even a high wind to render utter destruction when incendiaries are falling by the thousand. It is estimated, for instance, that there will be 400 fire alarms for each square mile of bombed territory—so that gives you some idea of how much good the local fire department can do!

Of course, Southern California isn't as densely built up as London. While great fear is felt for the aircraft factories themselves and the communities immediately surrounding them, Mr. Average Citizen hasn't a great deal to worry about. So scattered and sprawling is Southern California—even Los Angeles—that it is generally believed that fire bombs which do not actually fall on aircraft plants or in industrial areas where defense plants are operating will be effective only in a ratio of one to 20. In other words, only one in a score will actually start a fire of serious potentialities—*away from a plant!*

A flight of 40 airplanes, dropping 20,000 bombs, could figure on starting only 1,000 fires—but when one says "only 1,000 fires" he's really playing with magnesium. The bombs are reported to fall with a terminal velocity of about 600 m.p.h., which gives them plenty of penetrating power, as this is nearly the speed of a .45 caliber revolver bullet. Along with the crash they make, comes a terrifying and blinding flare as they strike. Through vents in the incendiary tube molten thermite scatters with a vicious hiss. In something less than a second, tremendous heat is generated, which covers yards. And small wonder for, as has been pointed out, that first minute of combustion has a flash point of 4,550° F. The thermite primer of aluminum powder and iron ioxide ignites the magnesium shell. If left alone, this will burn fiercely for about 15 minutes, although the heat intensity drops to around 2,700° F. One can readily imagine what this would do to the metal wing of an airplane, its fuselage or a motor! Igniting an inflammable with a match is one thing, while generating such terrific heat is another. Blast furnaces can't boast of temperatures approximating those of a fire bomb!

It is estimated that it requires at the present time (without using the Farris invention) about two minutes and 25 seconds to extinguish the average incendiary and, during that period, a tremendous amount of damage has been done to anything on which it has crashed. The combined heat of a number of these bombs can do incalculable damage in a room in a factory—and can, as has been shown, cause a fire in a residential district which might well sweep an aircraft factory into oblivion in a very short time.

Many interesting questions have been raised about the fire bomb, Southern California aircraft's most potential enemy. Why, for instance, can't one smother it with a metal covering? Well, because they won't smother. A thermite mixture is self-oxidizing, which means that it doesn't need oxygen, and therefore no covering has any value. They burn anyway!

So far, these rules have been promulgated for the aircraft workers who may face these barracuda of the air either at the factory or at home:

1. Keep your hat down over your eyes, as the glare from a fire bomb can permanently injure your sight.
2. Fold a wet blanket and sling it over your left arm to protect yourself against the terrific heat.
3. To keep the fire confined, close all doors.
4. Fight the bomb from the floor, as the air is cooler and cleaner there.
5. Roll on the floor if your clothes start burning.
6. Use anything but your own person in touching the bomb. You'll burn yourself seriously if you get too close.

And, in the meantime, Farris and his associates are spreading the word around Southern California that they have the fire bomb, the scourge of the skies, licked. At the rate defense plans are going in Southern California, the aircraft factories do not have too much to fear. When the actual test comes, we shall see. In the meantime, everyone has done everything possible to be prepared for any eventuality.

END

Letters

(*Continued from page 6*)

ly hazardous undertaking, for even the most routine forced-landing immediately can become a major disaster. Reader Swanson also should know that a "swallowed valve" many times can force an immediate landing. Neither should Reader Swanson have missed the point made by Mr. Brink in saying that there was little sense in climbing for altitude out over the ocean. Considering the fact that Mr. Brink was flying far out to sea, and out of reach of land regardless of the altitude he flew at, he wisely elected to stay low to take advantage of better flying conditions near the surface, and also to save precious time and fuel that would be wasted in a long and useless climb.—Ed.

Drafted Pilot

Sirs:

A recent article [Flying, June] told of the draft and its effect on the private pilot. It was enlightening in some ways to those who have private certificates and are ignorant of their status but there is another situation regarding private pilots who had the misfortune of being drafted

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first among the earliest of those after the Selective Service Act was passed. These men had no chance to take advantage of the various courses and plans offered by the CPT program and so suffered accordingly.

This situation is my pet peeve because, when I was drafted, I was working as a commercial pilot and about to receive my instructor's rating. All appeals failed and I went to camp after having been assured of an Air Corps assignment. Such classification was never received and so, for 16 months, I have wasted valuable time on the ground when pilots for various jobs have been badly needed in the Air Corps.

Appeals to air officers have been to no avail because they told me that my commercial certificate, which is still active, and my 360 hours are of no use to the Air Corps; I would have to wait for appointment as a cadet to fly in the Army.

In the meantime the Air Corps [now the Air Forces] has been enlisting commercial pilots for use in utility, service, or instruction work. They will also receive commissions if they successfully complete the refresher course given. After a year and one-half of military experience, a commercial certificate and three years of college it is still impossible [for me] to get the recognition and consideration that is shown civilians by the Air Forces.

Years of work and several thousand dollars got me a commercial license so it could be ignored when it is so badly needed. Right now it looks as if it is going to lapse at last because of the lack of funds and flying time.

So this is what the pilots in the ground forces are up against. Most of them got their flying the way that I did. By work and more work and the love of flying; not strictly because of the money in it. . . . Why doesn't someone check on our CAA records and present whereabouts and so make available more pilots and put them where they belong?

PRIVATE "GROUNDED".
Casual Detachment, Camp Complement
Indiantown, Pa.

END

How to Fly . . .

(*Continued from page 53*)

the passenger's seat, judging the performance.

After leaving the line, taxi out, using the ailerons and rudder together; use the brake only when needed—it saves both rubber and lining. Be alert, keep a sharp lookout for other planes, and turn the nose smoothly from side to side if it obscures forward vision.

Make the take-off smooth, and fly away when flying speed has been attained, but neither before nor after. Don't pull off, don't stall off. An airplane is designed to be flown—so fly it. Climb out of the field at exactly the climbing speed.

From now on, be prepared to *do something*. How about an emergency landing? In that field straight ahead? Good! (Don't turn back—that has been done before, and seldom very successfully.) Now start the first turn at the proper point and make it a precision, 90° turn. Keep climbing! Hold that airspeed at climbing rate and no other.

Leave the field and go up to altitude. Suppose we go to 3,500 feet for spins—a matter of, say, 10 minutes. What a marvelous opportunity to practice climbing precision turns. Make 90° turns on the section lines or crossroads, being satisfied only with a perfect, bubble-in-the-center turn with an accuracy of 90° and not 89°.

Be alert. Feel with the deep muscles—the kinaesthetic sense, the fingers and the toes. Absorb many things at the same time and take in every impression that your five senses receive. By so doing you form a good habit, and later on it will require no effort to be 100 per cent aware and alert.

Just before getting to 3,500 make a complete 360° turn. Don't wait until you get to 3,500 and then suddenly remember that you have not looked around or below and therefore must waste another minute craning the neck to see who is where. Remember: this is a planned flight, not a joy ride. When the turn is completed and the area found to be clear, close the throttle and start the spin. Do it exactly as you intend to do for the inspector and be satisfied with nothing less than the best. You should be able to do a spin to the right and a spin to the left and still have 1,800 feet altitude left.

Before losing any more altitude, a few stalls and steep turns should be tried. They could have been done at 3,500 feet—the order isn't important, but the idea is this: *don't* descend below 1,500 until you are ready for the low altitude work. Next try a spiral from 1,500-1,800 feet over a small field, shooting a precision landing into it. If it was good, find a pylon . . . and after doing half a dozen turns, cut your own throttle unexpectedly and see how you react. *Don't actually shoot a field* unless express permission has been granted to do so; just try to see how your judgment, field choice and reaction time stacks up.

On the way back to the airport follow a road and do some "S" turns across it. Climb up to the required altitude for your spot and shoot it without any delay. The second and third attempt should be in . . . if they are not, how can you expect to do it for the inspector?

The same planning applies to advanced work. Before getting into the plane, jot down on a knee pad the exact procedure to be followed. Take off, climb to altitude using the "S" turn or precision turn method and increase both feel and co-ordination instead of wasting valuable moments climbing straight ahead.

Then go into your act. Do as many diving maneuvers away from the field as toward the field, or if a strong wind is blowing upstairs watch the drift. Only an idiot will get 15 miles from the field and be forced to fly back for 15 minutes bucking a strong headwind. Better to get upwind from the field in the first place.

Do the high altitude maneuvers first; don't waste time climbing back up, unless it is for another crack at the same man-

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euver. Even then plan to do *something* on the way up there. And finally, when the time limit is reached, plan to have your plane at 1,500 feet and shoot a spot on some outlying field. Don't waste time and altitude.

The last type of flying is the cross-country flight, during which more good time is wasted than in any other form of activity—and during which, as a consequence, more people get lost than we could shake a stick at. Usually this is because of poor planning, or because an owner with a $2,000 airplane won't buy a 40 cent map to use on his cross-country work.

First: get a good map and good wind data at the altitude you intend to fly. Draw the course in, write the *magnetic* course down near the line. Mark off the line in 10-mile legs and number them in plain, large letters.

On your knee pad write in several columns: Place, Distance, Time, ETA (estimated time of arrival), Arrival and GS (ground speed). When the plane is on course, jot down the time and set watch to 12:00. (It is useful to get a cheap watch for this use and keep standard time on your wrist watch.) Then at 1:17 you will know that 1:17 minutes have elapsed, with no necessity for a laborious subtraction. Write down the ETA and keep the plane on course for the first check point, not more than 20 miles away and preferably less.

Flying at 3,000 feet a good pilot will have an emergency landing field picked out at any given time. To do this will require constant attention to business. There is the compass to check, the temperature group, the fuel consumption, the ground speed. There will be little time for just sitting and taking things easy—but on the other hand you'll get there—what's more, you'll know *when* you're going to get there.

Sometime all this so-called silliness is going to pay a dividend. A personal experience recalls a recent cross country when the going got tough between St. Louis and Tulsa, with the ceiling getting lower and the visibility worse. Fortunately, with one finger on the map and the other on a lucky number, a field was located nearby. But it could hardly have been found by the usual blunder-along method.

Plan your flight. Get value received in more ways than one—one way for the dollars spent, the other for the time involved and the knowledge yield. Whether you are practicing for a flight test or going to a convention, get 60 minutes' worth of flight time out of every hour.

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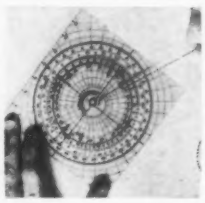

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Warplane Industry

(*Continued from page* 34)

by Canada since the start of the war for use as elementary flying and radio trainers. The company has also received an order for 200 *Moths* for the United States Lend-Lease aid.

Avro *Anson* twin-engined reconnaissance bomber: the *Anson* is used by the RCAF for bomber-pilot and navigational training. Originally planned to be shipped from Great Britain for use in the British Empire Air Training Plan, Britain's need for these ships in the summer of 1940, necessitated building them in Canada. The Canadian government set up a special company, Federal Aircraft, to assemble these planes from parts built by several Canadian companies. An order for 1,500 planes was well into production by the end of 1941, a maximum production of 30 weekly was planned. Meanwhile, English-built Avro *Ansons* have been coming to Canada for training purposes, as the plane is now considered entirely too slow for combat duty, but excellent as a flying classroom.

Tooling-up has started for the production of the *Lancaster* four-engined bomber, which replaces the Martin B-26. The *Lancaster*, on which little is known as yet, is being built by Canadian Car & Foundry Co. and the National Steel Car Co., which have plants at a number of points in Canada.

Early in 1942, Ottawa placed an order for 1,000 Curtiss Navy dive-bombers with the Canadian Car & Foundry Co. The order will occupy the full facilities of the Fort William, and most of the Montreal plants of the company, until late in 1944. The contract calls for 12 months sustained peak production and the estimated maximum output is placed at 80 per month. The first plane on this order is expected to be completed by early in 1943.

In addition to these aircraft now building in Canada, the Dominion's industry has been producing the Noorduyn *Norseman*, used as a trainer for radio operators of the RCAF, 56 of these planes being completed during 1941, at the Noorduyn aircraft plant at Montreal; the Blackburn *Shark* torpedo-bomber and reconnaissance seaplane (now obsolete); the *Lysander* army co-operation monoplane at the National Steel Car plant at Toronto, where 250 of these planes are on order—with 150 for Great Britain—the plane having a maximum speed of 234 m.p.h.; the Northrop *Delta*, built for photographic work for the RCAF, which is, however, now out of production.

Canada has also done some work on building plastic planes of the Vidal moulded plywood type, the Canadian government holding a license for the production of this process from the United States company. A plant at Belleville, Ontario, has been prepared for mass production of laminated wood-process fuselages. An all-wood *Anson* bomber fuselage has been exhaustively tested at Ottawa by the RCAF, and found to make 10 miles an hour greater speed than the metal fuselaged *Anson*.

Aircraft production in the Dominion comes under the control of Ralph P. Bell, director-general of aircraft production. He recently stated that 30 per cent of the 8,000 airplanes Canada had on order—including 1,000 ordered from United States plants—had been delivered by September, 1941. He also intimated that Canada has, for the time being, given up the idea of building an airplane engine industry, on obtaining assurances from the United States that the Dominion would be able to obtain all engines necessary for its airplane building program. This eliminates another demand on machine tool makers for tools to set up an engine industry. Canada now uses American-made Wright, Pratt & Whitney, Menasco, Jacobs and Kinner engines.

To the overhaul and repair of aircraft and engines, the Department of Munitions and Supply has set up 29 overhaul and repair plants, mostly under private ownership. These new plants take care of the 4,000 service planes used in training Canada's air force as well as those on active service on coastal defense. Many American mechanics have been brought to the Dominion for this work,

either to work in private companies or in the air force.

The Dominion now also makes parachutes at a number of plants in eastern and central Canada. The manufacture of aluminum aircraft propellers was recently started. Many electrically-operated instruments are now built in Canada—including temperature, fuel content, wing flap and wheel indicators, and aircraft radio instruments. Airplane forgings are now being produced in Canadian factories. By the autumn of 1942, Canada expects to be self-supporting in practically all airplane instruments, and to be exporting airplane propellers to Great Britain.

Bringing the aircraft industry to its present position has not been easy, for Canada lacked skilled aircraft labor, and had few of the types of air mechanics schools such as are common in the United States. Canada had the added difficulty of having to translate designs of British planes, to be built in the Dominion, into terms common to the American aircraft and machine tool industry, where tools and parts had to be ordered. The Canadian industry obtained much help from south of the international border, in setting up mass production techniques, and Canadian airplane plants such as Canadian Car and Foundry, Canadian Fairchild and Noorduyn are today showplaces of the industry. Labor has been trained at schools operated by the plants, and at technical schools set up by the various provincial governments.

Best description of the progress made in Canadian aviation industry since the outbreak of war came from Director-General Ralph P. Bell, when he told the National Industrial Advertisers' Association convention in Toronto:

"Most important of all, a year ago, almost the entire output was in elementary trainers; today almost half the output is in fighters and bombers. And when you realize that you can build a dozen trainers in the time it takes to build a fighter, and that the manufacture of one bomber is the equivalent of a month's output of trainers, you have a better appreciation of just what this statement signifies."

END

Swank School

(*Continued from page* 40)

in the tropical climates where Army airmen already are operating. Barring a possible tropical storm or two, normally very few hours will ever be lost here, the Army calculates, from continued hard work, physical and educational.

The schools started operating without the necessity of any large-scale construction work. Hotels leased for use of men in the officer candidate schools and the replacement center were stripped of most of their luxurious trappings and fitted out in style more in keeping with military requirements. Cots and double bunks permit quartering three or four men to a room. Lobbies and ballrooms were converted into classrooms. Restaurants were transformed practically overnight into

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Army operated mess-halls.

Golf courses, beaches and parks required a minimum of alteration. In a few hours military zones were set up by erection of signs along Collins avenue and adjacent streets, and by posting of guard details. Headquarters of the technical command are in the Cromwell hotel, which also houses the officers' mess. The Vanderbilt and Dorchester hotels were taken over. The hospital was set up in the Floridian hotel.

Only students of the officer candidate school and the men in the replacement center enjoy the accommodations in the leased hotels, however. Officers attending the training school and those on permanent duty in the Miami area must find their own quarters in hotels and apartments still commercially operated.

Favorable climate and housing will be reflected, officials are confident, in a low hospitalization rate.

"Normally, one of the Army's chief medical problems is a high rate of communicable disease," said Lieut. Col. Dan C. Ogle, medical officer. "Here men live in the open practically every hour of the day. Both training and study are conducted in an atmosphere of warm sunlight and fresh salt air. Nothing could be more conducive to toughening these men for war duty or could be a more effective safeguard against many of the ordinary communicable diseases."

Under Colonel Ogle, exceptional medical facilities have been set up in a vacant office building which now houses a central diagnostic laboratory and a 25-chair dental clinic. Here new enlisted men are given medical surveys, and spectacles and dental treatment provided to those who on arrival need such correction.

The reference to Miami Beach as a new West Point of the Air Forces is no mere turn of expression. The training is patterned on that of the U. S. Military Academy, with self-education as the keynote. Major Luper, 27-year-old director of training for the officer candidate school, describes it as a streamlined West Point technique.

"The burden of education is placed on the man himself," he said. "It is impossible, in the 12 weeks a soldier is here studying to become an officer, to provide him with all the knowledge he will require in the field. He can be given the basic information. Far more important, he can be made to dig it out for himself, thus developing the ingenuity and self-reliance so necessary in an efficient ground officer.

"The bulk of the time is spent in classroom study. The men are given an outline of the subjects with which they are expected to familiarize themselves; they are provided with manuals and books and informed as to other sources of information; but from there on, it is up to each man himself. For every three hours he spends in a classroom, he must spend at least two in outside study. This is a rigorous schedule, but the need for AAF ground officers is urgent."

Major Luper has supervised the training of aviation cadets at several AAF fields and is the author of several military handbooks. Incidentally, he noted, the staff of instructors at the candidate school—some of them officers and others expert civilians—are themselves given a course of training before they start to teach.

Altogether the AAF high command feels pride, with ample reason, over the manner in which a daring experiment has worked out thus far.

Said General Wooten: "Time is the critical element of this war. There is no way by which anyone can measure the importance of the many weeks that have been saved in expanding the Technical Training Command program. As for economy, living and mess quarters for enlisted men are being obtained at a yearly cost of less than one-fifth that required for the construction of new facilities. This economy has been achieved, I think, with no injury to any property owner and purely on a voluntary rental basis."

Since the nation's beginning, he noted, it has been accepted procedure for the Army to utilize hotels and eating houses for the needs of the military. But Miami Beach is something special.

Other cities and resorts have been eyeing the experiment with keen interest. Honolulu's famous Royal Hawaiian hotel, a victim of the war's blow to overseas tourist traffic, was put to Army use soon after the Pearl Harbor attack. As photographs began to appear of soldiers swarming over Miami Beach and Waikiki Beach, there were persistent reports that the Army might make use of hotels in Chicago for war purposes. And Ocean City, Md., an Atlantic coast resort favored by Washington and Baltimore summer vacationists before the tire and gasoline shortage, put in a plea through Sen. Millard E. Tydings of Maryland for use of some of its hotels for training commando units. The AAF is non-committal, but the Miami Beach idea may spread as the war's demands become greater.

END

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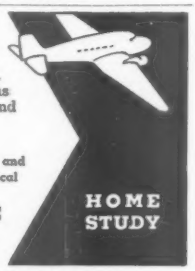

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Ladies Go to War

(Continued from page 47)

as possible to the training center at Toronto. As a result, graduates of the first courses hail from both the Atlantic and Pacific coast, the prairie provinces as well as industrialized Ontario and Quebec.

Training courses at present cover a five-week period with 150 recruits being taken in every week. In the first six months it is planned to train a force of 2,000 airwomen for the various jobs in the Canadian air force. When they are placed at the air training bases throughout Canada they will live in their own quarters at the air base, will be directed by air force officers in regard to work, while discipline and welfare will be the responsibility of the CWAAF officers.

The Canadian Women's Auxiliary Air Force takes in women between 21 and 40 years who can pass the medical examination, are over five feet in height, can pass a trade test for the position for which they are applying, have a minimum of high school entrance education and have no record of convictions for indictable offenses against them. No girls in the Canadian civil service, nor married women with children under 18 years of age, are being accepted. They join for service anywhere that Canadian air force troops may be sent, whether inside or outside the dominion.

Airwomen receive two-thirds the pay of their corresponding rank in the air force, thus starting at about 90 cents per day. There are three grades of airwomen: A.W.2, which is the rank on enlistment; A.W.1 and leading airwoman. Non-commissioned ranks start at corporal, go up to under officer class 1, which corresponds to warrant officer class 1 in the air force. Commissioned officers start at assistant section officer which is the equivalent of pilot officer in the air force or second lieutenant in the army. Highest rank in the CWAAF is air commandant, the equivalent to air commodore in the air force.

Although the uniforms of the air force auxiliary is practically the same as that worn by the men, the women's uniforms present greater tailoring difficulties, each airwoman having to be individually fitted and a large variety of stock kept on hand. It has been found, that the average shirt collar size taken by the women's auxiliary is 13½, average bust measure 36 and average cap size 7½. The women are supplied with their uniform free, except when appointed to officer rank. As officers they are given a uniform allowance and most procure their own outfits. The air force, however, stops at issuing underclothing. The British air force had too much trouble meeting the feminine requirements for undies, so the girls are given an initial allowance of $15 and a quarterly allowance of $3 for underclothing. They can pick their own.

Airwomen have to forget about such things as highly colored nail varnish and makeup, earrings, trinkets, bracelets and handbags. They are just not "according to regulations." They may wear a reasonable amount of makeup and nail polish, also wedding and signet rings. When on leave they can wear civilian clothes and dress up to their heart's desire. Incidentally, members of the CWAAF cannot marry without permission and at least six months' service.

Girls joining the administrative service of the CWAAF must have high school or similar educational qualification, must have had executive work in business or social work and be able to deal with and organize other people. Stenographers are required to take dictation at 100 words per minute, type at 40 words per minute and be familiar with office procedure. For general clerical work girls with business college training and at least three years' office experience are being taken.

Cooking will be a main job for the women's auxiliary, and cooks must be accustomed to catering to large numbers or be skilled practical cooks. Transport drivers must have a motor mechanic's certificate issued by a recognized trade school or automobile manufacturer and know how to drive on highways under all circumstances. Equipment assistants will go into stockrooms, and so must have stockroom and stock-keeping experience. For fabric workers the air force wants strong intelligent women with experience in sewing, especially with power-driven machines. Hospital assistants must have Red Cross or other ambulance training, and will do the work of nurses in training. Telephone operators must know switchboard operation and have a good speaking voice. Girls with domestic service experience are required for cleaning duties and as messengers and runners, while messwomen are those with experience as waitresses.

It is expected that before long the Canadian Women's Auxiliary Air Force will train its members for teleprinter and plotting duties, the jobs women are doing in a big way in Britain's WAAF in marking the course of raiding aircraft on large operations maps.

END

Pilot Savers

(Continued from page 50)

or Navy are reluctant to accept financial aid from an outside source. As a matter of fact, the procedure is made to look so cut and dried that most of them do not consider this as charity. And a surprising number write back after their acceptances to aver their intention of paying for the help. Their letters run consistently in this vein:

". . . realizing that the best way to show my gratitude would be to contribute toward the assistance of other fellows who might find themselves in the same predicament as I, I should like to pledge myself as a contributor to the AFSF just as soon as I am financially able . . ."

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CULVER					
W. E. Nelson, 849 Numbolt St., Denver, Colo	LA	Frnkln. 80	35 hr.	Just	2500
CURTISS					
Safair, Inc., Box 31, Somerville, New Jersey.	Fledgling	Chall. 185	1461 hr.		700
ERCOUPE					
Springfield Aviation Co., Municipal Airport, Springfield, Illinois	415	Cont. 65	234 hr.	Never	2250
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STINSON					
Air Activities, Inc., Municipal Airport, Houston Texas	SR-9C	Lyc. 260	1795 hr.	30 hr.	6500
Blvd. Airport, Inc., Roosevelt Blvd., & Red Lion Road, Philadelphia, Penna	105	Cont. 80	605 hr.	225 hr.	2400
Major J. D. Spencer, 1278 Oneida, Denver, Colorado	105	Cont. 75	250 hr.	20 hr.	1900
TAILORCRAFT					
Hobley-Maynard Air Service, New Orleans Airport, New Orleans, Louisiana		Cont. 65	998 hr.	62 hr.	1200
WACO					
Hobley-Maynard Air Service, New Orleans Airport, New Orleans, Louisiana	F	Warner 125	795 hr.	25 hr.	1600

A boy who had been rejected on two points of visual defect and who had been helped with financial and medical aid from AFSF wrote, "The Army grounded me but you started me flying again and believe you me, I am going to 'Keep 'em Flying.' A million thanks and best wishes . . ." Another said, "I was rejected by the Navy because of poor depth perception. My doctor said that nothing could be done to correct this. I sought advice. You gave not just encouragement but the sound advice to see your doctor. Within one month, after 30 minutes of treatment each day, I again took the exam and was accepted . . ."

Not content with the work it is doing, which is principally with draft age men, the Foundation is making an appeal to the 3,000,000 young men 18 and 19 years old who will be eligible for selective service within the next two years and ought to be considering the Air Forces. AFSF wants to acquaint them with the requirements for aviation cadets so they can start getting themselves into satisfactory condition now and not wait until the draft is about to catch up with them.

The star-studded advisory board of the organization includes Fiorello H. LaGuardia, Rear Adm. Richard E. Byrd, Clarence Chamberlin, Arthur R. Christie, Gov. Sumner Sewall, of Maine; Roscoe Turner, Maj. Reed Chambers, Donald W. Douglas, Sherman M. Fairchild, Richard Goldsmith, Robert F. Gross, Charles S. "Casey" Jones, Col. John H. Jouett, Grover Loening, Lauren D. Lyman, George F. McLaughlin, Thomas A. Morgan, Earl D. Osborn, J. Earl Schaeffer, Maj. Gill Robb Wilson, who said in his letter of acceptance "There is always time to do the vital things"; and John B. Walker.

The trustees are Mr. Roberts, chairman; Edward S. B. Walker, vice chairman; Maj. LeRoy A. Mullen, treasurer; John R. Ryan, secretary; Sidney Struble and Basil N. Bass, legal committee; Paul S. Zuckerman and Maj. Willis S. Fitch.

On the wall of one of the four offices occupied by the medical committee hangs a huge map of the United States. It is speckled with yellow, white, red, brown, gray and blue pins which represent localities where AFSF is working smoothly, where service is needed, where service is being established, where investigation is needed and where Army, Navy and Coast Guard stations are located. It is significant to note that the pins standing for "service needed" and "service being established" far outnumber all the rest.

It is easy to see what the immediate future of the AFSF will be. What of the distant future—two or three years from now? One hardly dares look that far ahead. But Mr. Roberts thinks the Foundation will still be in existence. "Some of the pilots won't be coming home, of course. And some will be coming home unfit for business. Some will come back to find their jobs gone, and some just won't be able to make the adjustment from war to peace. If you think we're rehabilitating pilots now, you've no conception of the job we'll have to do when peace is declared. But we'll do it."

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Airy Chat

(*Continued from page 4*)

of warfare in the Pacific. It seems almost providential that it was forced on us by lack of a big enough "old style" Navy. To many silent, patient U. S. Navy and Army airmen, the Jap war in the Pacific has proved a grim, bloody vindication.

* * *

SCOOPS, as they are known among journalists, are legitimate, hard-won luxuries in peacetime. But in wartime, a scoop can well be worse than a dozen carefully hidden time bombs. In gathering material for each issue of FLYING we have a tremendous duty to our country. Censorship alone plays only a small role in the suppression of aviation information in FLYING, that might be of value to the enemy. Censors do not check over newspapers and magazines before they are published; they can only clamp down *after* information dangerous to the country has been printed. So editors, who must make the original decisions as to what is or isn't information of a secret nature, have a tremendous responsibility.

Since Pearl Harbor, readers of FLYING have been treated to few luxuries of the scoop variety. They have been deprived deliberately. Every FLYING article having to do even remotely with aircraft production or operations is rushed—voluntarily—to appropriate Government authorities for checking. All deletions and suppressions — many of them senseless and unfair, in our opinion—are nevertheless made automatically. Photographs that might give the slightest information to the enemy are filed away or destroyed.

Occasionally, some aviation material is published elsewhere before appearing in FLYING. Sometimes material appears in FLYING months after it was first published elsewhere. There are many reasons, most of them beyond our control. For instance: just about everyone in American aviation is familiar with the Vega *Ventura*, military version of the Lockheed *Lodestar* and now going to the Royal Air Force in large numbers to augment its older counterpart, the Lockheed *Hudson*. Several aviation publications in this country—that apparently did not take the trouble to check with RAF officials in this country for security reasons—published many details on the *Ventura*. FLYING has not—at the specific request of the RAF. In England, photographs, silhouettes and descriptive data have been published describing the *Ventura*. FLYING recently published an article concerning a new development brought about by the specifications of the *Ventura*—but all references to the airplane by name were deleted at the request of the RAF. Yet, just the other day, a group of photographs sent into our office by one of the news picture agencies showed a number of aircraft on an air base in Canada, awaiting ferrying to England—and at least one *Ventura* was shown in the foreground.

Nevertheless, we still feel it our duty to check on all military aviation data before publication, despite such inconsistencies.

Please bear with us.

MAX KARANT.

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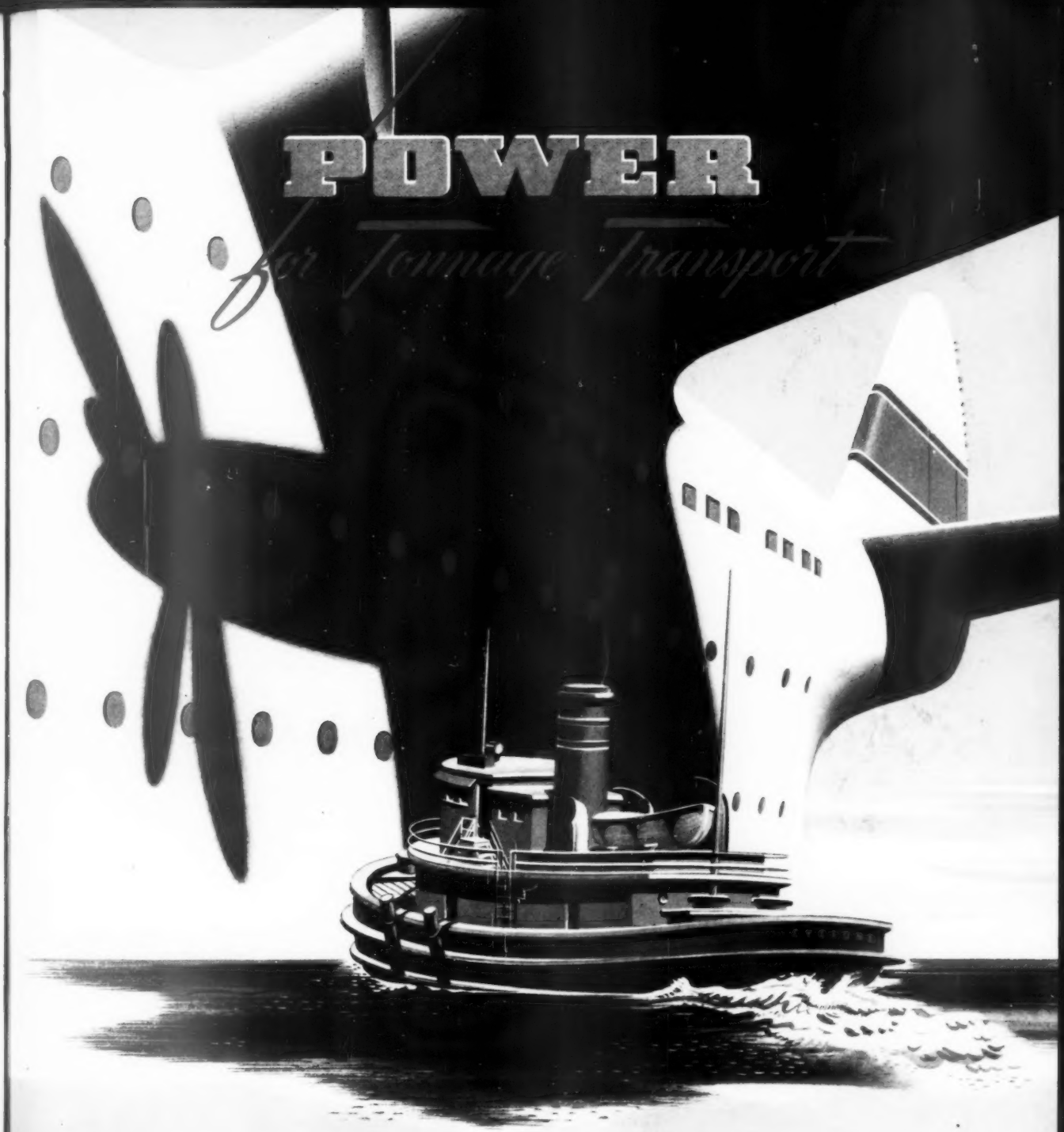

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